

=> FILE HCAPLU
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FILE COVERS 1907 - 6 May 2008 VOL 148 ISS 19
FILE LAST UPDATED: 5 May 2008 (20080505/ED)

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This file contains CAS Registry Numbers for easy and accurate substance identification.

=> D QUE L69
L2 19 SEA FILE=REGISTRY ABB=ON (106-97-8/BI OR 108-88-3/BI OR 12031-12-8/BI OR 12160-53-1/BI OR 124-18-5/BI OR 12442-45-4/BI OR 1306-38-3/BI OR 1313-99-1/BI OR 1314-23-4/BI OR 1314-36-9/BI OR 1345-13-7/BI OR 64-17-5/BI OR 67-56-1/BI OR 74-82-8/BI OR 7440-19-9/BI OR 7440-24-6/BI OR 7440-44-0/BI OR 7440-54-2/BI OR 7782-42-5/BI)
L3 10 SEA FILE=REGISTRY ABB=ON L2 AND O/ELS
L4 11 SEA FILE=REGISTRY ABB=ON L2 AND M/ELS
L5 8 SEA FILE=REGISTRY ABB=ON L3 AND L4
L6 7 SEA FILE=REGISTRY ABB=ON L5 NOT NI/ELS
L7 146265 SEA FILE=HCAPLUS ABB=ON L6
L9 97009 SEA FILE=HCAPLUS ABB=ON CERIA OR CE2O3 OR ZIRCONIA OR ZR2O3 OR (LA OR LANTHANUM) (W)GALL? OR LAGAO3 OR LAMNO3
L10 8900 SEA FILE=HCAPLUS ABB=ON (NICKEL OR NI) (2A) (FREE OR "NO" OR NONE OR ABSEN?)
L11 2376 SEA FILE=HCAPLUS ABB=ON (L7 OR L9) (L) ANODE?
L12 12 SEA FILE=HCAPLUS ABB=ON L10 AND L11
L13 3265 SEA FILE=HCAPLUS ABB=ON (COPPER OR CU) (2A) (PORE? OR POROUS? OR POROS?)
L14 3 SEA FILE=HCAPLUS ABB=ON L11 AND L13
L16 853 SEA FILE=HCAPLUS ABB=ON L11 NOT (NI OR NICKEL)
L18 43 SEA FILE=HCAPLUS ABB=ON L16 AND (CERMET? OR POR? (2A) CERAMIC?)
L19 12407 SEA FILE=HCAPLUS ABB=ON (NI OR NICKEL?) (5A) ANODE?
L20 157631 SEA FILE=HCAPLUS ABB=ON (L7 OR L9) NOT L19
L21 8906 SEA FILE=HCAPLUS ABB=ON L20 AND (FUEL? (2A) CELL# OR ELECTROCHEM ICAL?/SC, SX)
L22 503 SEA FILE=HCAPLUS ABB=ON L21 AND (CERMET? OR POR? (2A) CERAMIC?)
L23 195 SEA FILE=HCAPLUS ABB=ON L22 AND ANODE?
L24 60 SEA FILE=HCAPLUS ABB=ON L23 NOT (NI OR NICKEL OR NIO)
L28 10655 SEA FILE=HCAPLUS ABB=ON (SOLID (W) OXIDE (3A) FUEL? (2A) CELL# OR SOFC#)

KATHLEEN FULLER EIC1700 571/272-2505

L29	3647	SEA FILE=HCAPLUS ABB=ON	L28 AND ANODE?
L30	1542	SEA FILE=HCAPLUS ABB=ON	L29 NOT (NI OR NICKEL OR NIO?)
L31	80	SEA FILE=HCAPLUS ABB=ON	L30 AND (CERMET? OR POR?(2A)CERAMIC?)
L35	1542	SEA FILE=HCAPLUS ABB=ON	L30 NOT L10
L36	80	SEA FILE=HCAPLUS ABB=ON	L35 AND (CERMET? OR POR?(2A)CERAMIC?)
L37	73	SEA FILE=HCAPLUS ABB=ON	L36 AND ELECTROCHEMICAL?/SC
L38	125	SEA FILE=HCAPLUS ABB=ON	L12 OR L14 OR L18 OR L24 OR L31 OR L37
L40	107	SEA FILE=HCAPLUS ABB=ON	L38 NOT (NI OR NICKEL? OR NIO)
L41	95	SEA FILE=HCAPLUS ABB=ON	L40 AND ELECTROCHEMICAL?/SC,SX
L64	17	SEA FILE=HCAPLUS ABB=ON	L29 AND L10
L66	16	SEA FILE=HCAPLUS ABB=ON	L64 AND ELECTROCHEMICAL?/SC,SX
L67	116	SEA FILE=HCAPLUS ABB=ON	L41 OR L12 OR L66
L68	49	SEA FILE=HCAPLUS ABB=ON	L67 AND (1840-2001)/PRY,AY,PY
L69	7	SEA FILE=HCAPLUS ABB=ON	L10 AND L68

=> FILE INSPEC

FILE 'INSPEC' ENTERED AT 12:29:32 ON 06 MAY 2008

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<20080505/UP>

FILE COVERS 1898 TO DATE.

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THE ABSTRACT (/AB), BASIC INDEX (/BI) AND TITLE (/TI) FIELDS >>>

=> D QUE L71

L44	16557	SEA FILE=INSPEC ABB=ON	CERIA OR CE2O3 OR ZIRCONIA OR ZR2O3 OR (LA OR LANTHANUM) (W)GALL? OR LAGAO3 OR LAMNO3
L45	5203	SEA FILE=INSPEC ABB=ON	(SOLID(W)OXIDE (3A)FUEL? (2A)CELL# OR SOFC#)
L46	20074	SEA FILE=INSPEC ABB=ON	L44 OR L45
L47	17699	SEA FILE=INSPEC ABB=ON	L46 NOT (NI OR NICKEL OR NIO?)
L48	736	SEA FILE=INSPEC ABB=ON	L47 AND ANODE?
L49	3512	SEA FILE=INSPEC ABB=ON	SOLID OXIDE FUEL CELLS+NT/CT
L50	5472	SEA FILE=INSPEC ABB=ON	ANODES+NT/CT
L51	508	SEA FILE=INSPEC ABB=ON	L49 AND L50
L52	198	SEA FILE=INSPEC ABB=ON	L48 AND L51
L53	1663	SEA FILE=INSPEC ABB=ON	(NICKEL OR NI) (2A) (FREE OR "NO" OR NONE OR ABSEN?)
L54	22	SEA FILE=INSPEC ABB=ON	L46 AND L53
L55	220	SEA FILE=INSPEC ABB=ON	L52 OR L54
L56	60	SEA FILE=INSPEC ABB=ON	L55 AND (1950-2001)/PY
L57	51	SEA FILE=INSPEC ABB=ON	L51 AND L56
L58	5	SEA FILE=INSPEC ABB=ON	L57 AND CERMET?
L59	5164	SEA FILE=INSPEC ABB=ON	CERMETS/CT
L60	3	SEA FILE=INSPEC ABB=ON	L56 AND L59
L61	5	SEA FILE=INSPEC ABB=ON	L56 AND (CERMET? OR POR?(2A)CERAMIC?)
L62	5	SEA FILE=INSPEC ABB=ON	L58 OR L60 OR L61
L63	51	SEA FILE=INSPEC ABB=ON	L57 OR L62
L71	0	SEA FILE=INSPEC ABB=ON	L63 AND L53

=> FILE HCAPL

FILE 'HCAPLUS' ENTERED AT 12:30:03 ON 06 MAY 2008

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FILE COVERS 1907 - 6 May 2008 VOL 148 ISS 19

FILE LAST UPDATED: 5 May 2008 (20080505/ED)

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=> D QUE L70

L2 19 SEA FILE=REGISTRY ABB=ON (106-97-8/BI OR 108-88-3/BI OR 12031-12-8/BI OR 12160-53-1/BI OR 124-18-5/BI OR 12442-45-4/BI OR 1306-38-3/BI OR 1313-99-1/BI OR 1314-23-4/BI OR 1314-36-9/BI OR 1345-13-7/BI OR 64-17-5/BI OR 67-56-1/BI OR 74-82-8/BI OR 7440-19-9/BI OR 7440-24-6/BI OR 7440-44-0/BI OR 7440-54-2/BI OR 7782-42-5/BI)

L3 10 SEA FILE=REGISTRY ABB=ON L2 AND O/ELS

L4 11 SEA FILE=REGISTRY ABB=ON L2 AND M/ELS

L5 8 SEA FILE=REGISTRY ABB=ON L3 AND L4

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L13 3265 SEA FILE=HCAPLUS ABB=ON (COPPER OR CU) (2A) (PORE? OR POROUS? OR POROS?)

L14 3 SEA FILE=HCAPLUS ABB=ON L11 AND L13

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L22 503 SEA FILE=HCAPLUS ABB=ON L21 AND (CERMET? OR POR? (2A) CERAMIC?)

L23 195 SEA FILE=HCAPLUS ABB=ON L22 AND ANODE?

L24 60 SEA FILE=HCAPLUS ABB=ON L23 NOT (NI OR NICKEL OR NIO)

L28 10655 SEA FILE=HCAPLUS ABB=ON (SOLID (W) OXIDE (3A) FUEL? (2A) CELL# OR SOFC#)

L29 3647 SEA FILE=HCAPLUS ABB=ON L28 AND ANODE?

L30 1542 SEA FILE=HCAPLUS ABB=ON L29 NOT (NI OR NICKEL OR NIO?)

L31 80 SEA FILE=HCAPLUS ABB=ON L30 AND (CERMET? OR POR? (2A) CERAMIC?)

L35 1542 SEA FILE=HCAPLUS ABB=ON L30 NOT L10
L36 80 SEA FILE=HCAPLUS ABB=ON L35 AND (CERMET? OR POR?(2A)CERAMIC?)

L37 73 SEA FILE=HCAPLUS ABB=ON L36 AND ELECTROCHEMICAL?/SC
L38 125 SEA FILE=HCAPLUS ABB=ON L12 OR L14 OR L18 OR L24 OR L31 OR
L37
L40 107 SEA FILE=HCAPLUS ABB=ON L38 NOT (NI OR NICKEL? OR NIO)
L41 95 SEA FILE=HCAPLUS ABB=ON L40 AND ELECTROCHEMICAL?/SC, SX
L64 17 SEA FILE=HCAPLUS ABB=ON L29 AND L10
L66 16 SEA FILE=HCAPLUS ABB=ON L64 AND ELECTROCHEMICAL?/SC, SX
L67 116 SEA FILE=HCAPLUS ABB=ON L41 OR L12 OR L66
L68 49 SEA FILE=HCAPLUS ABB=ON L67 AND (1840-2001)/PRY,AY, PY
L69 7 SEA FILE=HCAPLUS ABB=ON L10 AND L68
L70 42 SEA FILE=HCAPLUS ABB=ON L68 NOT L69

=> D L69 BIB ABS IND 1-7

L69 ANSWER 1 OF 7 HCAPLUS COPYRIGHT 2008 ACS ON STN

AN 2001:419195 HCAPLUS Full-text

DN 135:172177

TI Electrochemical cell with two layers cathode for NO decomposition

AU Bredikhin, S.; Maeda, K.; Awano, M.

CS Synergy Ceramics Laboratory, FCRA, Shimo-Shidami, Moriyama-ku, Nagoya, 463-8687, Japan

SO Ionics (2001), 7(1 & 2), 109-115

CODEN: IONIFA; ISSN: 0947-7047

PB Institute for Ionics

DT Journal

LA English

AB An electrochem. cell composed of an yttria-stabilized zirconia disk and two layers cathode was used for nitrogen monoxide decomposition. It was found that covering the Pt cathode by a mixture of oxygen ionic conductor (YSZ) and electronic conductor (NiO) leads to enhancement of the performance of the electrochem. cell for NOx decomposition in the presence of excess oxygen. The decomposition activity was measured for the one-compartment cell oxide(cathode)YSZ(anode) by applying a DC voltage lower than 3.7 V in the temperature range 550-700°C. The microstructure of the YSZ-NiO mixed oxide electrodes was investigated in dependence of the cell operating condition and the working electrode sintering temperature. The correlation between the microstructure of the mixed oxide electrode and conversion rate of NO was studied. The phenomenon of self-optimization of the microstructure of the NiO-YSZ working electrode during the cell operation was observed and investigated.

CC 72-3 (Electrochemistry)

Section cross-reference(s): 57, 59

ST nitrogen monoxide decomn electrolytic cell two layer cathode; nickel oxide yttria stabilized zirconia two layer platinum cathode

IT Electric current

(effect on NO conversion in electrochem. cell with two layers cathode)

IT Cathodes

Decomposition

Electrochemical cells

(electrochem. cell with two layers cathode for NO decomposition)

IT Current efficiency

(for NO conversion in electrochem. cell with two layers cathode)

IT Microstructure

(of YSZ-NiO mixed oxide electrodes)

IT Solid electrolytes

(use in electrochem. cell with two layers cathode for NO decomposition)

- IT 64417-98-7, Yttrium zirconium oxide
RL: DEV (Device component use); NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(NO decomposition in electrochem. cell with two layers cathode covered with NiO and)
- IT 1313-99-1, Nickel oxide, uses
RL: DEV (Device component use); NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(NO decomposition in electrochem. cell with two layers cathode covered with YSZ and)
- IT 7782-44-7P, Oxygen, processes
RL: MSC (Miscellaneous); PEP (Physical, engineering or chemical process); PNU (Preparation, unclassified); PREP (Preparation); PROC (Process)
(electrochem. cell with two layers cathode for NO decomposition in excess of)
- IT 10102-43-9, Nitrogen monoxide, reactions
RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(electrochem. cell with two layers cathode for decomposition of)
- IT 7440-06-4, Platinum, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(use as electrodes in electrochem. cell with two layers cathode for NO decomposition)
- IT 1314-23-4, Zirconium oxide (ZrO₂), uses
RL: DEV (Device component use); NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(yttria-stabilized; NO decomposition in electrochem. cell with two layers cathode covered with NiO and)
- IT 1314-36-9, Yttrium oxide (Y₂O₃), uses
RL: DEV (Device component use); NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(zirconia stabilized with; NO decomposition in electrochem. cell with two layers cathode covered with NiO and)
- RE.CNT 14 THERE ARE 14 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L69 ANSWER 2 OF 7 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1998:755090 HCAPLUS Full-text

DN 130:174327

TI Selective decomposition of nitrogen monoxide to nitrogen in the presence of oxygen on RuO₂/Ag(cathode)/yttria-stabilized zirconia/Pd(anode)

AU Iwayama, Kazuyoshi; Wang, Xinpeng

CS Chemicals Research Laboratories, Toray Industries, Inc., Minato-ku, Oe-cho, Nagoya, Japan

SO Applied Catalysis, B: Environmental (1998), 19(2), 137-142
CODEN: ACBEE3; ISSN: 0926-3373

PB Elsevier Science B.V.

DT Journal

LA English

AB Selective decomposition of nitrogen monoxide (NO) in the presence of oxygen was studied on electrochem. cells composed of yttria-stabilized zirconia (YSZ), electrodes, and surface oxide layers added. Decomposition activity was first measured on metal oxide/Pd(cathode)/YSZ/Pd(anode) at 773-973 K and 3.0 V of applied voltage in a flow of 50 mL/min containing 1000 ppm of NO and 6% of O₂ in helium. Coating of various metal oxides onto the cathode electrode greatly changed the decomposition activity; the order was RuO₂>Pt>Rh2O3>Rn>none>Ag>WO₃. The activity of the system modified by RuO₂ has been investigated as a function of the kind of electrode, the applied

- voltage, and the reaction temperature The cell of RuO₂/Ag(cathode)/YSZ/Pd(anode) was found to show the most excellent activity among the cells examined The conversion of NO and the current efficiency for NO decomposition reached 31.8% and 11.8%, resp., at 7 mA/cm² of c.d. induced by 2.2 V and 773 K, and the NO decomposition proceeded selectively about 13 times than the O₂ decomposition under the reaction condition.
- CC 72-2 (Electrochemistry)
- Section cross-reference(s): 56, 57
- ST nitrogen monoxide decompn zirconia ruthenium oxide electrochem cell
- IT Temperature
(effect on selective decomposition of nitrogen monoxide to nitrogen on RuO₂/Ag(cathode)/yttria-stabilized zirconia/Pd(anode) in presence of oxygen)
- IT Current density
Electrochemical cells
(for selective decomposition of nitrogen monoxide to nitrogen on RuO₂/Ag(cathode)/yttria-stabilized zirconia/Pd(anode) in presence of oxygen)
- IT Current efficiency
(for selective decomposition of nitrogen monoxide to nitrogen on palladium coated by RuO₂, Pt, Ru₂O₃, Ni, Ag and WO₃)
- IT Electric current-potential relationship
(of selective decomposition of nitrogen monoxide to nitrogen on RuO₂/Ag(cathode)/yttria-stabilized zirconia/Pd(anode) in presence of oxygen)
- IT Decomposition
(selective decomposition of nitrogen monoxide to nitrogen on RuO₂/Ag(cathode)/yttria-stabilized zirconia/Pd(anode) in presence of oxygen)
- IT 10102-43-9, Nitrogen monoxide, properties
RL: PEP (Physical, engineering or chemical process); PRP (Properties); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(selective decomposition in presence of oxygen on RuO₂/Ag(cathode)/yttria-stabilized zirconia/Pd(anode))
- IT 7782-44-7, Oxygen, uses
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(selective decomposition of nitrogen monoxide to nitrogen on RuO₂/Ag(cathode)/yttria-stabilized zirconia/Pd(anode) in presence of)
- IT 12036-10-1, Ruthenium oxide RuO₂
RL: CAT (Catalyst use); DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(selective decomposition of nitrogen monoxide to nitrogen on RuO₂/Ag(cathode)/yttria-stabilized zirconia/Pd(anode) in presence of oxygen)
- IT 7440-05-3, Palladium, uses 7440-22-4, Silver, uses 64417-98-7, Yttrium zirconium oxide
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(selective decomposition of nitrogen monoxide to nitrogen on RuO₂/Ag(cathode)/yttria-stabilized zirconia/Pd(anode) in presence of oxygen)
- IT 1314-35-8, Tungsten oxide WO₃, uses 7440-02-0, Nickel, uses 7440-06-4, Platinum, uses 12036-35-0, Rhodium oxide Rh₂O₃
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(selective decomposition of nitrogen monoxide to nitrogen on palladium coated by)

IT 1314-23-4, Zirconium oxide (ZrO₂), uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(yttria stabilized; selective decomposition of nitrogen monoxide to nitrogen on RuO₂/Ag(cathode)/yttria-stabilized zirconia/Pd(anode) in presence of oxygen)

IT 1314-35-9, Yttrium oxide (Y₂O₃), uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(zirconia stabilized by; selective decomposition of nitrogen monoxide to nitrogen on RuO₂/Ag(cathode)/yttria-stabilized zirconia/Pd(anode) in presence of oxygen)

RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L69 ANSWER 3 OF 7 HCAPLUS COPYRIGHT 2008 ACS ON STN

AN 1998:283367 HCAPLUS [Full-text](#)

DN 128:310442

TI Relationships between fabrication procedures, structure and conductivity of Ni/YSZ cermet anodes

AU Brown, M. S.; Sammes, N. M.; Mogensen, M.

CS Centre for Technology, University of Waikato, Hamilton, 3105, N. Z.

SO Proceedings - Electrochemical Society (1997), 97-40(Solid Oxide Fuel Cells), 861-868
CODEN: PESODO; ISSN: 0161-6374

PB Electrochemical Society

DT Journal

LA English

AB A number of Ni/yttria-stabilized zirconia (YSZ) cermet anodes for solid oxide fuel cells were examined to determine structural requirement, and in-plane conduction based on fabrication techniques. YSZ was prepared using calcining temps. 1100° and 1400° and ball milling and centrifugal milling procedures to vary the particle size and particle distribution. Alternative coating comps. using Me Et ketone and ethanol and various binders were examined with the resulting slurries being air sprayed onto YSZ substrates. Sintering temps. of 1250-1450° were used to determine the degree of sintering of both ceramic phases. Optical microscopy and SEM were used to determine the structure of the resulting anodes. The resultant Ni/YSZ cermet anode required a relatively high d. in order to obtain electronic conduction.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST nickel yttria stabilized zirconia cermet anode; fuel cell cermet anode fabrication property; solid oxide fuel cell cermet anode

IT Fuel cell anodes
(relationships between fabrication procedures, structure, and conductivity of nickel/yttria-stabilized zirconia cermet anodes for solid oxide fuel cells)

IT 143107-06-6
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(relationships between fabrication procedures, structure, and conductivity of nickel/yttria-stabilized zirconia cermet anodes for solid oxide fuel cells)

RE.CNT 11 THERE ARE 11 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L69 ANSWER 4 OF 7 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1997:754528 HCAPLUS Full-text

DN 128:63973

TI Ni/YSZ (yttria-stabilized zirconia) cermet for fuel
anodes for solid electrolyte fuel cells and their preparation

IN Nagayama, Hiroyuki; Aizawa, Masanobu

PA Toto Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 9 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 09302438	A	19971125	JP 1996-143427	19960515 <--
PRAI	JP 1996-143427		19960515	<--	
AB	The title Ni/YSZ cermet satisfies Ni:YSZ composition ratio 24-64:36-76, average particle size $\leq 2 \mu\text{m}$, and [(number of grain boundaries between Ni and YSZ)/(number of total grain boundaries including those between Ni and Ni, and between YSZ and YSZ)] ratio along a linear axis in the cermet is ≥ 0.4 . The title cermet is prepared by (1) preparing powdered containing each oxides of Ni, Zr, and Y, by wet process or by copptn. method, (2) first calcining the powders, (3) pulverizing the obtained powders (NiO/YSZ composites), (4) second calcining, (5) coating the obtained calcined powders (NiO/YSZ composites) on substrates by slurry coating method, and (6) firing at 1200-1450° followed by reduction. The prepared cermet has a structure of homogeneous and minute Ni dispersion, and give long life, when used at high temperature for a long time as solid electrolyte fuel cell anodes.				
IC	ICM C22C029-12				
CC	ICS C23C024-08; H01M004-86; H01M004-88				
ST	52-2 (Electrochemical, Radiational, and Thermal Energy Technology)				
IT	Section cross-reference(s): 56, 57				
ST	nickel zirconia cermet fuel cell anode; yttria stabilized zirconia cermet fuel cell				
IT	Cermet				
IT	Fuel cell anodes (preparation of Ni/(Y2O3-stabilized ZrO2) cermet for fuel anodes for solid electrolyte fuel cells)				
IT	1314-36-3, Yttria, uses RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses) (cermet component; preparation of Ni/(Y2O3-stabilized ZrO2) cermet for fuel anodes for solid electrolyte fuel cells)				
IT	7440-02-0P, Nickel, uses RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses) (preparation of Ni/(Y2O3-stabilized ZrO2) cermet for fuel anodes for solid electrolyte fuel cells)				
IT	1314-23-4P, Zirconia, uses RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses) (yttria-stabilized; preparation of Ni/(Y2O3-stabilized ZrO2) cermet for fuel anodes for solid electrolyte fuel cells)				

L69 ANSWER 5 OF 7 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1997:447950 HCAPLUS Full-text

DN 127:68574

TI Solid-oxide fuel cells

KATHLEEN FULLER EIC1700 571/272-2505

IN Lindsay, Thomas Gordon
 PA University Court of Napier University, UK
 SO Brit. UK Pat. Appl., 25 pp.
 CODEN: BAXXDU
 DT Patent
 LA English
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	GB 2305169	A	19970402	GB 1996-19285	19960916 <--
PRAI	GB 1996-19285	A	19960916	<--	
	GB 1995-18856	A	19950914	<--	
	GB 1995-21512	A	19951020	<--	
	GB 1996-3145		19960215	<--	

AB A material for use in solid-oxide fuel cells comprises a Ni-Cr oxide spinel. The material is electronically conducting and may also comprise free Ni oxide and oxidation-resistant metallic (Ag, Pt, or Nichrome) particles. A surface-coated wire is also provided for use in fuel cells, preferably the wire is coated by being buried in electrode material. The wire contains Cr and the coating consists of doped Ni chromite or high-temperature oxidation-resistant Co brazing alloy. In a fuel-cell stack, the individual cells are elec. connected as anode-anode and cathode-cathode pairs by using porous interconnectors.

IC ICM H01M008-12

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST solid oxide fuel cell; nickel
 chromium oxide spinel fuel cell

IT Fuel cells
 (solid-oxide; materials for)

IT Cobalt alloy

RL: TEM (Technical or engineered material use); USES (Uses)
 (chromium-containing wire for solid-oxide fuel cells coated with)

IT 1313-99-1D, Nickel oxide, nonstoichiometric 7440-06-4, Platinum, uses 7440-22-4, Silver, uses 12605-70-8, Nichrome

RL: TEM (Technical or engineered material use); USES (Uses)
 (nickel-chromium oxide spinel for solid-oxide fuel cells containing)

IT 12687-47-7, Chromium nickel oxide

RL: TEM (Technical or engineered material use); USES (Uses)
 (spinel for solid-oxide fuel cells)

L69 ANSWER 6 OF 7 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1995:710690 HCAPLUS Full-text

DI 123:118440

TI Relations between performance and structure of Ni-YSZ-cermet SOFC anodes

AU Mogensen, M.; Primdahl, S.; Reheinlander, J. T.; Gormsen, S.; Linderoth, S.; Brown, M.

CS Mater. Dep., Risoe Natl. Lab., DK-4000, Den.

SO Proceedings - Electrochemical Society (1995), 95-1(Solid Oxide Fuel Cells (SOFC-IV)), 657-66
 CODEN: PESODO; ISSN: 0161-6374

PB Electrochemical Society

DT Journal

LA English

AB A number of different Ni-YSZ (Y2O3-stabilized ZrO2) cermet structures are studied in H2/H2O in the range of 800-1000° by means of impedance spectroscopy

and d.c. electrochem. methods. The electrochem. performance is correlated with the structure of the cermet as revealed by microscopy. Quant. image anal. is used in describing some of the microstructures. Expts. are carried out on both very fine and very coarse structures including the limiting case of a Ni-point electrode. Three arches are observed in the impedance spectra. The dependence of the three associated polarization resistance components on structure, temperature and overvoltage is reported. A tentative model for the Ni-YSZ-H₂/H₂O electrode is described.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST fuel cell anode nickel yttria zirconia

IT Anodes

(fuel-cell, relations between performance and structure of Ni/yttria-stabilized zirconia cermet solid oxide fuel cell anodes)

IT 112721-99-0

RL: DEV (Device component use); USES (Uses)

(relations between performance and structure of Ni/yttria-stabilized zirconia cermet solid oxide fuel cell anodes)

L69 ANSWER 7 OF 7 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1992:654903 HCAPLUS Full-text

DN 117:254903

OREF 117:44043a,44046a

TI Manufacture of cermet fuel-cell anodes attached on solid electrolyte

IN Jensen, Russel R.

PA Westinghouse Electric Corp., USA

SO U.S., 10 pp.

CODEN: USXXAM

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 5141825	A	19920825	US 1991-736361	19910726 <--
PRAI	US 1991-736361		19910726 <--		

AB The method comprises (a) mixing Ni powder and 1-10 weight% Y2O3-stabilized ZrO2 having particle diameter $\leq 3 \mu\text{m}$ with an organic binder solution to form a slurry, (b) applying the slurry to the surface of dense stabilized ZrO2 solid electrolyte, (c) heating the dried slurry to remove the binder and form a porous layer of Ni substantially surrounded and separated by smaller Y2O3-stabilized ZrO2 particles, and (d) electrochem.-vapor depositing a dense Y2O3-stabilized ZrO2 skeletal structure between and around the Ni and Y2O3-stabilized ZrO2 particles at 1000-1400°. The anodes are porous and no sintering among Ni particles happens during the preparation

IC ICM H01M008-10

INCL 429031000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 56, 57

ST fuel cell nickel zirconia anode; electrochem vapor deposition fuel cell anode

IT Vapor deposition processes

(electro-, in nickel-zirconia anode manufacture for solid-electrolyte fuel cells)

IT Anodes

(fuel-cell, nickel-yttrium zirconium oxide cermets, on solid electrolyte, manufacture of, by electrochem.-vapor deposition)

IT 106830-29-9P, Yttrium zirconium oxide (Y0.2Zr0.9O2.1)

RL: PREP (Preparation)

KATHLEEN FULLER EIC1700 571/272-2505

(anodes, on solid electrolyte, manufacture of, for fuel cells)

=> FILE INSPEC

FILE 'INSPEC' ENTERED AT 12:32:27 ON 06 MAY 2008

Compiled and produced by the IET in association WITH FIZ KARLSRUHE

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FILE LAST UPDATED: 5 MAY 2008

<20080505/UP>

FILE COVERS 1898 TO DATE.

<<< SIMULTANEOUS LEFT AND RIGHT TRUNCATION AVAILABLE IN

THE ABSTRACT (/AB), BASIC INDEX (/BI) AND TITLE (/TI) FIELDS >>>

=> D QUE L63

L44	16557	SEA FILE=INSPEC ABB=ON	CERIA OR CE2O3 OR ZIRCONIA OR ZR2O3 OR (LA OR LANTHANUM) (W)GALL? OR LAGAO3 OR LAMN03
L45	5203	SEA FILE=INSPEC ABB=ON	(SOLID (W)OXIDE (3A)FUEL? (2A)CELL# OR SOFC#)
L46	20074	SEA FILE=INSPEC ABB=ON	L44 OR L45
L47	17699	SEA FILE=INSPEC ABB=ON	L46 NOT (NI OR NICKEL OR NIO?)
L48	736	SEA FILE=INSPEC ABB=ON	L47 AND ANODE?
L49	3512	SEA FILE=INSPEC ABB=ON	SOLID OXIDE FUEL CELLS+NT/CT
L50	5472	SEA FILE=INSPEC ABB=ON	ANODES+NT/CT
L51	508	SEA FILE=INSPEC ABB=ON	L49 AND L50
L52	198	SEA FILE=INSPEC ABB=ON	L48 AND L51
L53	1663	SEA FILE=INSPEC ABB=ON	(NICKEL OR NI) (2A) (FREE OR "NO" OR NONE OR ABSEN?)
L54	22	SEA FILE=INSPEC ABB=ON	L46 AND L53
L55	220	SEA FILE=INSPEC ABB=ON	L52 OR L54
L56	60	SEA FILE=INSPEC ABB=ON	L55 AND (1950-2001)/PY
L57	51	SEA FILE=INSPEC ABB=ON	L51 AND L56
L58	5	SEA FILE=INSPEC ABB=ON	L57 AND CERMET?
L59	5164	SEA FILE=INSPEC ABB=ON	CERMETS/CT
L60	3	SEA FILE=INSPEC ABB=ON	L56 AND L59
L61	5	SEA FILE=INSPEC ABB=ON	L56 AND (CERMET? OR POR? (2A) CERAMIC?)
L62	5	SEA FILE=INSPEC ABB=ON	L58 OR L60 OR L61
L63	51	SEA FILE=INSPEC ABB=ON	L57 OR L62

=> DUP REM L70 L63

FILE 'HCAPLUS' ENTERED AT 12:32:51 ON 06 MAY 2008

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FILE 'INSPEC' ENTERED AT 12:32:51 ON 06 MAY 2008

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PROCESSING COMPLETED FOR L70

PROCESSING COMPLETED FOR L63

L72 89 DUP REM L70 L63 (4 DUPLICATES REMOVED)

=> D L72 1-89 ALL

L72 ANSWER 1 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 2003:202977 HCAPLUS [Full-text](#)

DN 138:224212

ED Entered STN: 14 Mar 2003

TI Method for producing electric separators and their use

KATHLEEN FULLER EIC1700 571/272-2505

IN Hennige, Volker; Hying, Christian; Hoerpel, Gerhard
 PA Creavis Gesellschaft fuer Technologie und Innovation MbH, Germany
 SO PCT Int. Appl., 27 pp.
 CODEN: PIXXD2
 DT Patent
 LA German
 IC ICM H01M002-16
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 72

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2003021697	A2	20030313	WO 2002-EP9266	20020820 <--
	WO 2003021697	A3	20031218		
	W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW			
	RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			
	DE 10142622	A1	20030320	DE 2001-10142622	20010831 <--
	AU 2002333473	A1	20030318	AU 2002-333473	20020820 <--
	EP 1419544	A2	20040519	EP 2002-797544	20020820 <--
	EP 1419544	B1	20050105		
	R:	AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, SK			
	AT 286627	T	20050115	AT 2002-797544	20020820 <--
	JP 200502177	T	20050120	JP 2003-525926	20020820 <--
	TW 561643	B	20031111	TW 2002-91119495	20020828 <--
	US 20050031942	A1	20050210	US 2004-487245	20040920 <--
	US 7351494	B2	20080401		
FRAI	DE 2001-10142622	A	20010831	<--	
	WO 2002-EP9266	W	20020820		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2003021697	ICM	H01M002-16
	IPCI	H01M0002-16 [ICM,7]
	IPCR	D03D0015-12 [I,C*]; D03D0015-12 [I,A]; H01M0002-16 [I,C*]; H01M0002-16 [I,A]
	ECLA	H01M002/16B1; H01M002/16D
DE 10142622	IPCR	D03D0015-12 [I,C*]; D03D0015-12 [I,A]; H01M0002-16 [I,C*]; H01M0002-16 [I,A]
AU 2002333473	IPCI	H01M0002-16 [ICS,7]; B01D0069-10 [ICS,7]; B01D0069-12 [ICS,7]; B01D0069-00 [ICS,7,C*]; B01D0071-02 [ICS,7]; B01D0071-00 [ICS,7,C*]
	IPCR	D03D0015-12 [I,C*]; H01M0002-16 [I,C*]; D03D0015-12 [I,A]; H01M0002-16 [I,A]
EP 1419544	IPCI	H01M0002-16 [ICM,7]; B01D0071-02 [ICS,7]; B01D0071-00 [ICS,7,C*]; B01D0069-10 [ICS,7]; B01D0069-12 [ICS,7]; B01D0069-00 [ICS,7,C*]
	IPCR	D03D0015-12 [I,C*]; D03D0015-12 [I,A]; H01M0002-16 [I,C*]; H01M0002-16 [I,A]
AT 286627	IPCI	H01M0002-16 [ICM,7]; B01D0071-02 [ICS,7]; B01D0071-00 [ICS,7,C*]; B01D0069-10 [ICS,7]; B01D0069-12 [ICS,7];

B01D0069-00 [ICS,7,C*]
 JP 2005502177 IPCI H01M0002-16 [ICM,7]; D03D0015-12 [ICS,7]
 IPCR H01M0002-16 [I,A]; H01M0002-16 [I,C*]
 FTERM 4L048/AA02; 4L048/AA03; 4L048/DA24; 5H021/BB01;
 5H021/BB12; 5H021/CC02; 5H021/CC04; 5H021/EE21;
 5H021/EE22; 5H021/EE28; 5H021/HH00; 5H021/HH01;
 5H021/HH03; 5H021/HH06
 TW 561643 IPCI H01M0002-14 [ICM,7]
 IPCR D03D0015-12 [I,C*]; D03D0015-12 [I,A]; H01M0002-16
 [I,C*]; H01M0002-16 [I,A]
 US 20050031942 IPCI H01M0002-16 [I,A]
 IPCR D03D0015-12 [I,C*]; D03D0015-12 [I,A]; H01M0002-16
 [I,C*]; H01M0002-16 [I,A]
 NCL 429/144.000; 427/226.000; 427/372.200; 428/432.000
 ECLA H01M002/16B1; H01M002/16D
 AB The invention relates to elec. separators and to a method for producing the
 same. An elec. separator is a separator that is used in batteries and other
 assemblies, in which electrodes must be separated from one another, e.g.,
 while maintaining ion conductivity. The separator is preferably a thin,
 porous, insulating material with a high ion permeability, excellent mech.
 strength and long-term stability against the chems. and solvents used in the
 system, e.g., in the electrolyte of the battery. In batteries, the aim of the
 separator is to completely insulate the cathode from the anode. In addition,
 the separator must be permanently elastic and follow the displacements in the
 system, e.g. in the electrode package during charging and discharging. This
 is achieved by an inventive elec. separator comprising a flat, flexible
 substrate provided with a plurality of orifices and a coating both on and in
 the substrate. The substrate material is selected from woven or nonwoven,
 elec. non-conductive glass or ceramic fibers, or a combination of materials of
 this type and the coating is a porous, elec. insulating ceramic coating. The
 separator is characterized in that it has a thickness of less than 100 µm.
 ST battery separator prep
 IT Synthetic fibers
 RL: DEV (Device component use); USES (Uses)
 (aluminum nitride oxide silicide; method for producing elec. separators
 and their use)
 IT Synthetic fibers
 RL: DEV (Device component use); USES (Uses)
 (aluminum nitride; method for producing elec. separators and their use)
 IT Synthetic fibers
 RL: DEV (Device component use); USES (Uses)
 (aluminum oxide; method for producing elec. separators and their use)
 IT Synthetic fibers
 RL: DEV (Device component use); USES (Uses)
 (boron nitride, fibers; method for producing elec. separators and their
 use)
 IT Ceramics
 (fibers; method for producing elec. separators and their use)
 IT Secondary battery separators
 (method for producing elec. separators and their use)
 IT Glass fibers, uses
 RL: DEV (Device component use); USES (Uses)
 (method for producing elec. separators and their use)
 IT Synthetic fibers
 RL: DEV (Device component use); USES (Uses)
 (silica; method for producing elec. separators and their use)
 IT Synthetic fibers
 RL: DEV (Device component use); USES (Uses)
 (silicon carbide; method for producing elec. separators and their use)
 IT Synthetic fibers

RL: DEV (Device component use); USES (Uses)
 (silicon nitride; method for producing elec. separators and their use)

IT Synthetic fibers
 RL: DEV (Device component use); USES (Uses)
 (zirconia; method for producing elec. separators and their use)

IT 1299-86-1, Aluminum carbide 1303-86-2, Boron oxide, uses 1309-48-4, Magnesium oxide, uses 1314-23-4, Zirconium oxide, uses 1314-36-9, Yttrium oxide, uses 1332-29-2, Tin oxide 7631-86-9, Silicon oxide, uses 10043-11-5, Boron nitride, uses 11115-87-0, Hafnium nitride 11116-16-8, Titanium nitride 11116-19-1, Yttrium carbide 11116-21-5, Yttrium nitride 11129-18-3, Cerium oxide 11129-37-6, Hafnium carbide 12055-23-1, Hafnium oxide 12069-32-8, Boron carbide 12070-08-5, Titanium carbide 12070-14-3, Zirconium carbide 13463-67-7, Titanium oxide, uses 24304-00-5, Aluminum nitride 37317-02-5, Cerium nitride 51680-58-1, Magnesium carbide 52036-93-8, Tin carbide 55574-97-5, Tin nitride 56127-34-5, Magnesium nitride 66526-06-5, Cerium carbide 119173-61-4, Zirconium nitride
 RL: TEM (Technical or engineered material use); USES (Uses)
 (coating; method for producing elec. separators and their use)

IT 1344-28-1, Aluminum oxide (Al₂O₃), uses
 RL: DEV (Device component use); USES (Uses)
 (fiber; method for producing elec. separators and their use)

IT 409-21-2, Silicon carbide (SiC), uses 12033-89-5, Silicon nitride (Si₃N₄), uses
 RL: DEV (Device component use); USES (Uses)
 (fibers; method for producing elec. separators and their use)

IT 78-10-4, Tetraethoxysilane 1343-98-2, Silicic acid 17501-44-9, Zirconium acetylacetonate
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
 (method for producing elec. separators and their use)

IT 138289-12-0, Boron(1+), nitridotetra-
 RL: DEV (Device component use); USES (Uses)
 (method for producing elec. separators and their use)

L72 ANSWER 2 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 2003:565633 HCAPLUS Full-text

DN 139:136027

ED Entered STN: 24 Jul 2003

TI Anode for a solid oxide fuel cell and an associated solid-electrolyte fuel cell

IN Bauer, Christiane; Schichl, Hermann

PA Siemens A.-G., Germany

SO Ger. Offen., 6 pp.

CODEN: GWXXBX

DT Patent

LA German

IC ICM H01M004-90

ICS H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 10163013	A1	20030724	DE 2001-10163013	20011220 <--
PRAI	DE 2001-10163013		20011220	<--	
CLASS	PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES		

KATHLEEN FULLER EIC1700 571/272-2505

DE 10163013 ICM H01M004-90
ICS H01M008-10
IPCI H01M0004-90 [ICM,7]; H01M0008-10 [ICS,7]
IPCR H01M0004-86 [I,C*]; H01M0004-86 [I,A]; H01M0004-90
[I,C*]; H01M0004-92 [I,A]; H01M0008-12 [I,C*];
H01M0008-12 [I,A]
ECLA H01M004/86B6; H01M004/92; H01M008/12B2B4

AB A cermet anode with sufficient electronic and ionic conductivity and a catalytic activity sufficient for an internal reformation of fuel gases is proposed. The cermet contains Pd or Pd alloys as a catalytic component and metallic conductor. The associated solid-electrolyte fuel cell contains an electrolyte made of O ion-conductive oxide ceramics (yttria-stabilized zirconia or scandia-stabilized zirconia), the cathode made of a LaSr(Ca)Mn Perovskite layer, and the cermet anode containing Pd or Pd alloy.

ST cermet anode solid oxide
fuel cell; fuel cell solid state

IT Fuel cell anodes
(for solid oxide fuel cells)

IT Fuel cells
(solid oxide; cermet anode for)

IT 131622-09-8, Calcium lanthanum manganese strontium oxide
RL: DEV (Device component use); USES (Uses)
(cathode for solid oxide fuel cell)

IT 566899-17-0 566899-58-9 566899-74-9 566900-69-4
RL: DEV (Device component use); USES (Uses)
(cermet anode for solid oxide fuel cell)

IT 64417-98-7, Yttrium zirconium oxide
RL: DEV (Device component use); USES (Uses)
(electrolyte for solid oxide fuel cell)

IT 7440-06-4, Platinum, uses 7440-32-6, Titanium, uses 7440-57-5, Gold, uses 7440-67-7, Zirconium, uses
RL: MOA (Modifier or additive use); USES (Uses)
(palladium alloy containing; in cermet anode for solid oxide fuel cell)

IT 1314-23-4, Zirconia, uses
RL: DEV (Device component use); USES (Uses)
(yttria-stabilized; electrolyte for solid oxide fuel cell)

IT 1314-36-9, Yttria, uses
RL: DEV (Device component use); USES (Uses)
(zirconia stabilized by; electrolyte for solid oxide fuel cell)

RE.CNT 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
(1) Anon; US 01044043 A1
(2) Anon; DE 69011839 T2

L72 ANSWER 3 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN
AN 2002:142599 HCAPLUS Full-text
DN 136:186671
ED Entered STN: 22 Feb 2002
TI The fabrication of an electrically conducting contact layer on a metallic substrate for a fuel cell
IN Diekmann, Uwe; Goebbels, Heinz; Sigismund, Egon
PA Forschungszentrum Juelich G.m.b.H., Germany
SO PCT Int. Appl., 14 pp.

CODEN: PIXXD2
 DT Patent
 LA German
 IC ICM B23K035-00
 ICS H01M008-02; B23K101-36
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 FAN.CMT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002014011	A1	20020221	WO 2001-DE3116	20010811 <--
W: CA, JP, US				
RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR				
DE 10040499	A1	20020307	DE 2000-10040499	20000818 <--
DE 10040499	C2	20020627		
EP 1315594	A1	20030604	EP 2001-969240	20010811 <--
EP 1315594	B1	20070711		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI, CY, TR				
AT 366634	T	20070815	AT 2001-969240	20010811 <--
PRAI DE 2000-10040499	A	20000818	<--	
WO 2001-DE3116	W	20010811	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2002014011	ICM	B23K035-00
	ICS	H01M008-02; B23K101-36
	IPCI	B23K0035-00 [ICM,7]; H01M0008-02 [ICS,7]; B23K101-36 [ICS,7]
	IPCR	B23K0035-00 [I,C*]; B23K0035-00 [I,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-12 [N,C*]; H01M0008-12 [N,A]
DE 10040499	ECLA	B23K035/00B8; H01M008/02C2A; H01M008/02C2K2; L23K; T01M
	IPCI	C22C0005-06 [ICM,7]; B23K0001-008 [ICS,7]; H01M0008-02 [ICS,7]
	IPCR	B23K0035-00 [I,C*]; B23K0035-00 [I,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-12 [N,C*]; H01M0008-12 [N,A]
EP 1315594	ECLA	B23K035/00B8; H01M008/02C2A; H01M008/02C2K2
	IPCI	B23K0035-00 [I,C]; B23K0035-00 [I,A]
	IPCR	B23K0035-00 [I,C]; B23K0035-00 [I,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-12 [N,C*]; H01M0008-12 [N,A]
AT 366634	ECLA	B23K035/00B8; H01M008/02C2A; H01M008/02C2K2; L23K; T01M
	IPCI	B23K0035-00 [I,C]; B23K0035-00 [I,A]
	IPCR	B23K0035-00 [I,C]; B23K0035-00 [I,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-12 [N,C*]; H01M0008-12 [N,A]
	ECLA	B23K035/00B8; H01M008/02C2A; H01M008/02C2K2; L23K; T01M

AB A method to produce a conducting contact layer on a metallic substrate such as a Al2O3 alloy bipolar plate or a Cermet anode, is described. An Al containing layer is applied on the metallic substrate, followed by a Ag contact. Al foil and Ag gauze can be used to create the two layers. During heating in vacuum the Ag and the Al forms an eutectic Ag-Al solder. This method is especially suitable for creating a solid connection between the Ag contact elements on the anodic and cathodic sides of a high temperature fuel cell.

ST fuel cell conducting contact silver aluminum eutectic solder

IT Fuel cell anodes
 (Cermet; fabrication of elec. conductive contact layer on a

metallic substrate for a fuel cell)

IT Electric contacts
(fabrication of elec. conductive contact layer on a metallic substrate for a fuel cell)

IT Fuel cells
(solid oxide; fabrication of elec. conductive contact layer on a metallic substrate for a fuel cell)

IT 1344-28-1, Alumina, uses 7429-90-5, Aluminum, uses 7440-22-4, Silver, uses 11118-57-3, Chrome oxide
RL: DEV (Device component use); USES (Uses)
(fabrication of elec. conductive contact layer on a metallic substrate for a fuel cell)

IT 73391-04-5, Aluminum, silver (eutectic)
RL: DEV (Device component use); FMU (Formation, unclassified); FORM (Formation, nonpreparative); USES (Uses)
(fabrication of elec. conductive contact layer on a metallic substrate for a fuel cell)

RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Divecha, A; US 5100049 A 1992
(2) Dixon, C; US 3471677 A 1969
(3) Kernforschungsanlage Juelich; DE 4410711 C 1995 HCAPLUS
(4) Reed, E; US 3416218 A 1968
(5) Terrill, J; US 3337947 A 1967 HCAPLUS

L72 ANSWER 4 OF 89 INSPEC (C) 2008 IET on STN
AN 2001:7089548 INSPEC DN A2001-24-8630G-014; B2001-12-8410G-019 Full-
text

TI Catalytic and electrochemical properties of doped lanthanum chromites as new anode materials for solid oxide fuel cells

AU Vernoux, P.; Djurado, E.; Guillodo, M. (Lab. d'Electrochimie et de Physico-Chimie des Mater. et des Interfaces, CNRS, St. Martin d'Heres, France)

SO Journal of the American Ceramic Society (Oct. 2001), vol.84, no.10, p. 2289-95, 25 refs.
CODEN: JACTAW, ISSN: 0002-7820
SICI: 0002-7820(200110)84:10L:2289:CEPD;1-Z
Published by: American Ceramic Soc, USA

DT Journal

TC Experimental

CY United States

LA English

AB Defective perovskites contained in the general formula La(Sr)Cr(Ru,Mn)O3-δ are successfully synthesized by spray pyrolysis. Powders of high phase purity are obtained after annealing, and they are used to prepare homogeneous films by spray printing. From a catalytic point of view for the methane steam reforming, these powdered perovskites do not generate a carbon deposit. Catalytic results, focused on doped ruthenium perovskites, confirm that the insertion of ruthenium in the structure of the lanthanum chromite presents a real benefit for the methane steam reforming. The electrochemical properties of La(Sr)CrO3-δ, either pure and doped with manganese, show that the perovskite films can be potential electrodes, depending on their doping, for hydrogen anodic oxidation in solid oxide fuel cells

CC A8630G Fuel cells; A8265J Heterogeneous catalysis at surfaces and other surface reactions; A8120E Powder techniques, compaction and sintering; A8120L Preparation of ceramics and refractories; A8230L Decomposition reactions (pyrolysis, dissociation, and group ejection); A8245 Electrochemistry and electrophoresis; A8140G Other heat and thermomechanical treatments; A8115R Spray coating techniques; B8410G Fuel

- cells; B0520X Other thin film deposition techniques; B0540 Ceramics and refractories (engineering materials science)
- CT annealing; anodes; anodisation; catalysts; ceramics; electrochemical electrodes; lanthanum compounds; materials preparation; powder technology; powders; pyrolysis; solid oxide fuel cells; spray coating techniques; strontium compounds
- ST general formula La(Sr)Cr(Ru,Mn)O3- δ ; spray pyrolysis; phase purity are obtained after annealing, and they are used to prepare homogeneous films; phase purity; annealing; homogeneous films; spray printing; methane steam reforming; powdered perovskites; doped ruthenium perovskites; structure; electrochemical properties; La(Sr)CrO3- δ ; perovskite films; electrodes; H anodic oxidation; solid oxide fuel cells; catalytic properties; doped lanthanum chromites; anode materials; La(Sr)Cr(RuMn)O3; La(Sr)CrO3
- CHI LaSrCrRuMnO3 ss, Cr ss, La ss, Mn ss, O3 ss, Ru ss, Sr ss, O ss; LaSrCrO3 ss, CrO3 ss, Cr ss, La ss, O3 ss, Sr ss, O ss
- ET Cr*La*Ru*Sr; Cr sy 4; sy 4; La sy 4; Ru sy 4; Sr sy 4; La(Sr)Cr(Ru; La cp; cp; Sr cp; Cr cp; Ru cp; Mn; Cr*O*Sr; Cr sy 3; sy 3; O sy 3; Sr sy 3; (Sr)CrO3- δ ; O cp; Cr*Mn*O*Ru*Sr; Cr sy 5; sy 5; Mn sy 5; O sy 5; Ru sy 5; Sr sy 5; (Sr)Cr(RuMn)O3; Mn cp; (Sr)CrO3; SrCrRuMnO; Cr; La; O; Ru; Sr; SrCrO; Cr*O; CrO; Cr*La*O*Sr; O sy 4; La(Sr)CrO3- δ
- L72 ANSWER 5 OF 89 INSPEC (C) 2008 IET on STN
- AN 2002:7149826 INSPEC DN A2002-04-8630G-018; B2002-02-8410G-029 Full-text
- TI Reliability and accuracy of measured overpotential in a three-electrode fuel cell system
- AU Chan, S.H.; Chen, X.J.; Khor, K.A. (Sch. of Mech. & Production Eng., Nanyang Technol. Univ., Singapore)
- SO Journal of Applied Electrochemistry (Oct. 2001), vol.31, no.10, p. 1163-70, 12 refs.
CODEN: JAELEBJ, ISSN: 0021-891X
SICI: 0021-891X(200110)31:10L:1163:RAMO;1-1
Price: 0021-891X/01/\$19.50
Published by: Kluwer Academic Publishers, Netherlands
- DT Journal
- TC Practical; Experimental
- CY Netherlands
- LA English
- AB Numerical simulation was conducted to study the potential and current density distributions at the active electrode surface of a solid oxide fuel cell. The effects of electrode deviation, electrolyte thickness and electrode polarization resistance on the measurement error were investigated. For a coaxial anode /electrolyte/cathode system, where the radius of the anode is greater than that of cathode, the cathode overpotential is overestimated while the anode overpotential is underestimated. Although the current interruption method or impedance spectroscopy can be employed to compensate/correct the error for a symmetric electrode configuration, it is not useful when dealing with the asymmetric electrode system. For the purpose of characterizing the respective overpotentials in a fuel cell, the cell configuration has to be carefully designed to minimize the measurement error, in particular the selection of the electrolyte thickness, which may cause significant error. For the anode -support single fuel cell, it is difficult to distinguish the polarization between the anode and cathode with reference to a reference electrode. However, numerical results can offer an approximate idea about the source/cause of the measurement error and provide design criteria for the fuel cell to improve the reliability and accuracy of the measurement technique
- CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; B8410G

Fuel cells; B7110 Measurement theory; B0290Z Other numerical methods
anodes; cathodes; current density; current distribution;
electrochemical electrodes; electrochemistry; electrolytes; measurement
errors; measurement theory; numerical analysis; polarisation; solid
oxide fuel cells; voltage distribution
ST three-electrode solid oxide fuel cell; overpotential measurements;
numerical simulation; current density distributions; potential
distributions; active electrode surface; SOFC; electrode deviation;
electrolyte thickness; electrode polarization resistance; measurement
error; coaxial anode/electrolyte/cathode system; cathode overpotential;
anode overpotential; current interruption method; impedance spectroscopy;
asymmetric electrode system; anode-support single fuel cell

L72 ANSWER 6 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 2001:841657 HCAPLUS Full-text

DN 136:186551

ED Entered STN: 20 Nov 2001

TI Development of anodes for direct oxidation of hydrocarbon fuels

AU Gorte, R. J.; Kim, H.; Vohs, J. M.

CS Dep. Chem. Eng., Univ. Pennsylvania, Philadelphia, PA, 19104, USA

SO Preprints of Symposia - American Chemical Society, Division of Fuel

Chemistry (2001), 46(2), 678-679

CODEN: PSADFZ; ISSN: 1521-4648

PB American Chemical Society, Division of Fuel Chemistry

DT Journal

LA English

CC 52-2 (Electrochemical, Radiational, and Thermal Energy
Technology)

Section cross-reference(s): 57, 72

AB Direct electrochem. oxidation of a wide variety of hydrocarbon fuels was
evaluated in a direct-oxidation solid oxide fuel cell with YSZ (yttria-
stabilized zirconia) as the electrolyte and Cu-YSZ cermet as the fuel cell
anode. Strontium-doped LaMnO₃ was used as the cell cathode. Addition of a
second metal oxide catalyst can enhance and modify the activities of the anode
catalysts (e.g., for propylene oxidation, addition of ceria promotes oxidation
to CO₂, whereas addition of molybdena favored oxidation to acrolein). Open-
circuit voltages of 0.9-1.1 V were routinely observed for fuel cells
combusting butane, decane, toluene, and synthetic diesel fuel, with good cell
performance stability. Significant improvements in the performance can be
expected when fuel cells are synthesized with thinner electrolytes, with
improved anode structures, and with enhanced anode oxidation activities.

ST fuel cell cathode copper cermet; hydrocarbon
combustion fuel cell cathode copper cermet;
yttria stabilized zirconia copper cermet fuel
cell anode

IT Cermet

Combustion catalysts

(copper-YSZ cermet as fuel cell

anodes for direct oxidation of hydrocarbon fuels)

IT Diesel fuel

(oxidation and combustion of, in fuel cells;

copper-YSZ cermet as fuel cell

anodes for direct oxidation of hydrocarbon fuels)

IT Fuel cell anodes

(solid-oxide; copper-YSZ cermet as

fuel cell anodes for direct oxidation of

hydrocarbon fuels)

IT 1306-38-3, Cerium oxide (CeO₂), uses 1313-27-5, Molybdena, uses

RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)

(anodes containing; copper-YSZ cermet as fuel

- cell anodes for direct oxidation of hydrocarbon fuels)
IT 12031-12-8, Lanthanum manganese oxide (LaMnO3)
RL: DEV (Device component use); USES (Uses)
(cathodes; copper-YSZ cermet as fuel cell
anodes for direct oxidation of hydrocarbon fuels)
IT 64417-98-7, Yttrium zirconium oxide
RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)
(composites, cermet anodes and solid electrolytes;
copper-YSZ cermet as fuel cell
anodes for direct oxidation of hydrocarbon fuels)
IT 7440-50-8, Copper, uses
RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)
(composites, cermet anodes; copper-YSZ
cermet as fuel cell anodes for
direct oxidation of hydrocarbon fuels)
IT 107-02-8, Acrolein, formation (nonpreparative)
RL: FMU (Formation, unclassified); FORM (Formation, nonpreparative)
(formation of, in fuel cell combustion; copper-YSZ
cermet as fuel cell anodes for
direct oxidation of hydrocarbon fuels)
IT 106-97-8, Butane, reactions 108-88-3, Toluene, reactions 115-07-1,
Propylene, reactions 124-18-5, n-Decane
RL: CPS (Chemical process); PEP (Physical, engineering or chemical
process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)
(oxidation and combustion of, in fuel cells;
copper-YSZ cermet as fuel cell
anodes for direct oxidation of hydrocarbon fuels)
IT 1314-23-4, Zirconia, uses
RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)
(yttria-stabilized, composites; copper-YSZ cermet as
fuel cell anodes for direct oxidation of
hydrocarbon fuels)

RE.CNT 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE

- (1) Craciun, R; J Electrochem Soc 1999, V146, P4019 HCAPLUS
- (2) Gorte, R; Advanced Materials 2000, V12, P1465 HCAPLUS
- (3) Kim, H; J Electrochem Soc, in press
- (4) Minh, N; J Am Ceram Soc 1993, V76, P563 HCAPLUS
- (5) Park, S; J Electrochem Soc 1999, V146, P3603 HCAPLUS
- (6) Park, S; Nature 2000, V404, P265 HCAPLUS
- (7) Perry Murray, E; Nature V400, P649
- (8) Putna, E; Langmuir 1995, V11, P4832 HCAPLUS
- (9) Steele, B; Nature 1999, V400, P620

L72 ANSWER 7 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 2003:928022 HCAPLUS [Full-text](#)

DN 139:397921

ED Entered STN: 28 Nov 2003

TI Long term stability of SOFC with Sc doped zirconia
electrolyte

AU Herbstritt, Dirk; Warga, Christian; Weber, Andre; Ivers-tiffée, Ellen

CS Institut fuer Werkstoffe der Elektrotechnik; Universitaet Karlsruhe,
Karlsruhe, 76131, Germany

SO Proceedings - Electrochemical Society (2001), 2001-16(Solid
Oxide Fuel Cells VII), 349-357
CODEN: PESODO; ISSN: 0161-6374

PB Electrochemical Society

DT Journal

LA English

CC 52-2 (Electrochemical, Radiational, and Thermal Energy

Technology)

AB A 10 mol% scandium-doped ZrO₂ (10ScSZ) was investigated as an electrolyte material for electrolyte supported single cells. The cells with an electrolyte thickness of 200 μ m and an electrode area of 10 cm² have been characterized by current-voltage measurement and impedance spectroscopy. To decrease the ohmic losses, 10ScSZ was applied for the electrolyte substrate as well as in the anode cermet and the multilayer cathode. To decrease the cathodic polarization losses a lanthanum strontium manganese oxide (LSM) thin film cathode layer covered by a screen-printed LSM layer was applied. A maximum power d. of 0.35 W/cm² at 800° was achieved in air (0.7 L/min) and hydrogen (0.5 L/min). Long term measurements at 950° for >3500 h at a c.d. of 400 mA/cm² showed a significant increase in elec. power output during the first 1000 h.

ST solid oxide fuel cell stability
electrolyte; scandium doped zirconia electrolyte fuel
cell

IT Fuel cell electrolytes
(long-term stability of solid oxide fuel
cells with scandium-doped zirconia electrolyte)

IT Fuel cells
(solid oxide; long-term stability of solid
oxide fuel cells with scandium-doped
zirconia electrolyte)

IT 109118-30-1, Scandium zirconium oxide (Sc_{0.2}Zr_{0.902}.1)
RL: DEV (Device component use); USES (Uses)
(long-term stability of solid oxide fuel
cells with scandium-doped zirconia electrolyte)

RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE

(1) Appleby, A; Fuel Cell Handbook 1989
(2) Beie, H; 3rd European solid oxide fuel cell Forum 1998, P3
(3) Christie, G; Solid Oxide Fuel Cells V, The Electrochemical Society
Proceedings Series 1997, VPV97-40, P718
(4) Herbstritt, D; Proceedings 6th Int Symp on SOFC, The Electrochemical
Society Proceedings Series 1999, VPV99-19, P972
(5) Manner, R; Solid Oxide fuel cells II, EUR 13546 EN 1991, P715
(6) Weber, A; High Temperature Electrochemistry: Ceramics and Metals 1996, P473
HCAPLUS
(7) Yamamoto, O; Electrochimica Acta 2000, V45, Pp2423

L72 ANSWER 8 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN
AN 2002:281431 HCAPLUS Full-text
DN 136:388431
ED Entered STN: 16 Apr 2002
TI Thermal stress and long-term behavior of layered ceramic thin film
composites: a foundation for solid oxide fuel
cell technology

AU Reifsnider, K.; Huang, X.
CS Materials Response Group, Virginia Polytechnic Institute and State
University, Blacksburg, VA, 24061-0219, USA
SO Proceedings of the American Society for Composites, Technical Conference (2001), 16th, 337-344
CODEN: PAMTEG; ISSN: 1084-7243
PB CRC Press LLC
DT Journal; (computer optical disk)
LA English
CC 52-2 (Electrochemical, Radiational, and Thermal Energy
Technology)
AB A Planar Solid Oxide Fuel Cell

(PSOFC) stack has a repeated multilayered structure consisting of many basic cells. A basic cell consists of a porous ceramic cathode layer, a dense ceramic electrolyte layer, and a porous metal-ceramic composite anode layer. Addnl. dense ceramic or metallic layers connect unit cells together into a series and are termed interconnect plates. One way to manufacture the multi-layered structure of PSOFC is to co-fire the component layers together at a high temperature, typically over 1200°C. PSOFC is operated in a temperature range from 600°C to 1000°C. The close match of thermal expansion coeffs. of the component materials is critical to minimize residual thermal stress and to avoid mech. failure during processing and operation. Edge and internal delamination between a dense and a porous layer; and transverse cracking of the electrolyte layer are expected failure modes. Driving forces of these mech. failure modes are analyzed quant. Thermal-mech. properties of the component layers and interfaces evolve during operation. Their implications on the long-term performance of PSOFC are discussed.

ST solid oxide fuel cell thermal
stress long term performance

IT Fuel cells
(solid oxide; thermal stress and long-term behavior
of layered ceramic thin film composites, a foundation for solid
oxide fuel cell technol.)

IT Ceramics
Composites
(thermal stress and long-term behavior of layered ceramic thin film
composites, a foundation for solid oxide
fuel cell technol.)

IT Stress, mechanical
(thermal; thermal stress and long-term behavior of layered ceramic thin
film composites, a foundation for solid oxide
fuel cell technol.)

RE.CNT 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

- (1) Hutchinson, J; Advances in Applied Mechanics 1992, V29, P63
- (2) Hyer, M; Stress Analysis of Fiber-Reinforced Composite Materials 1998
- (3) Kokini, K; Journal of Applied Mechanics 1998, V55, P767
- (4) Minh, N; Science and Technology of Ceramic Fuel Cells 1995
- (5) Pagano, N; International Journal of Mechanical Science 1973, V15, P679
- (6) Zhu, D; Surface and Coating Technology 1998, V108-109, P114 HCAPLUS

L72 ANSWER 9 OF 89 INSPEC (C) 2008 IET on STN

AN 2003:7612598 INSPEC DN A2003-12-8630G-007; B2003-06-8410G-027 Full-
text

TI Characterisation of oxide anodes for fuel cells
AU Canales Vazquez, J.; Zhou, W.; Irvine, J.T.S. (Sch. of Chem., St. Andrews
Univ., UK)

SO Electron Microscopy and Analysis 2001. Proceedings, 2001, p. 295-8 of
xv+529 pp., 4 refs.

Editor(s): Aindow, M.; Kiely, C.J.

ISBN: 0 7503 0812 5

Published by: IOP Publishing, Bristol, UK

Conference: Electron Microscopy and Analysis 2001. Proceedings, Dundee,
UK, 5-7 Sept. 2001

DT Conference; Conference Article

TC Practical; Experimental

CY United Kingdom

LA English

AB New materials belonging to the La₂Sr_n-2Ti_nO_{3n+1} system have been targeted as
having the potential to provide suitable materials for high performance anode
applications in solid oxide fuel cells. These compounds can be regarded as an
intergrowth of two different structures, viz. distorted pyrochlore (La₂Ti₂O₇)

- and perovskite (SrTiO₃). By synthesising intergrown structures between the above two end members, it is possible to follow the evolution of the system from monoclinic through to cubic phases
- CC A8630G Fuel cells; A6630H Self-diffusion and ionic conduction in solid nonmetals; A6470K Solid-solid transitions; A8245 Electrochemistry and electrophoresis; A6160 Crystal structure of specific inorganic compounds; B8410G Fuel cells
- CT anodes; crystal structure; electrochemical electrodes; ionic conductivity; lanthanum compounds; solid oxide fuel cells; solid-state phase transformations; strontium compounds; transmission electron microscopy
- ST anode applications; oxide anodes; solid oxide fuel cells; distorted pyrochlore; perovskite; intergrown structures; cubic phases; monoclinic phases; SrTiO₃; La₂Sr_n-2Ti_nO_{3n+1}; La₂Ti₂O₇
- CHI SrTiO₃ ss, TiO₃ ss, O₃ ss, Sr ss, Ti ss, O ss; La₂SrTiO ss, La₂ ss, La ss, Sr ss, Ti ss, O ss; La₂Ti₂O₇ ss, La₂ ss, Ti₂ ss, La ss, O₇ ss, Ti ss, O ss
- ET O*Ti; TiO₃; Ti cp; cp; O cp; O*Sr*Ti; O sy 3; sy 3; Sr sy 3; Ti sy 3; Sr_n-2Ti_nO_{3n+1}; Sr cp; Ti₂O₇; TiO; O; Sr; Ti; SrTiO; La; Ti₂O; La*O*Sr*Ti; La sy 4; sy 4; O sy 4; Sr sy 4; Ti sy 4; La₂Sr_n-2Ti_nO_{3n+1}; La cp; La*O*Ti; La sy 3; La₂Ti₂O₇; SrTiO₃
- L72 ANSWER 10 OF 89 INSPEC (C) 2008 IET on STN
- AN 2002:7142456 INSPEC DN A2002-04-8630G-006; B2002-02-8410G-016 Full-text
- TI Catalytic properties of new anode materials for solid oxide fuel cells operated under methane at intermediary temperature
- AU Sauvet, A.-L.; Fouletier, J. (Lab. d'Electrochimie et de Physico-chimie des Matériaux et des Interfaces, INPG, Saint Martin d'Heres, France)
- SO Journal of Power Sources (15 Oct. 2001), vol.101, no.2, p. 259-66, 13 refs.
CODEN: JPSODZ, ISSN: 0378-7753
SICI: 0378-7753(20011015)101:2L:259:CPAM;1-3
Price: 0378-7753/01/\$20.00
Doc.No.: S0378-7753(01)00763-7
Published by: Elsevier, Switzerland
- DT Journal
- TC Experimental
- CY Switzerland
- LA English
- AB The recent trend in solid oxide fuel cell concerns the use of natural gas as fuel. Steam reforming of methane is a well-established process for producing hydrogen directly at the anode side. In order to develop new anode materials, the catalytic activities of several oxides for the steam reforming of methane were characterized by gas chromatography. We studied the catalytic activity as a function of steam/carbon ratios r. The methane and the steam content were varied between 5 and 30% and between 1.5 and 3.5%, respectively, corresponding to r-values between 0.07 and 0.7. Catalyst (ruthenium and vanadium)-doped lanthanum chromites substituted with strontium, gadolinium-doped ceria (Ce_{0.9}Gd_{0.1}O₂) referred as to CeGdO₂, praseodymium oxide, molybdenum oxide and copper oxide were tested. The working temperature was fixed at 850°C, except for 5% ruthenium-doped La_{1-x}Sr_xCrO₃ where the temperature was varied between 700 and 850°C. Two types of behavior were observed as a function of the activity of the catalyst. The higher steam reforming efficiency was observed with 5% of ruthenium above 750°C
- CC A8630G Fuel cells; A8265J Heterogeneous catalysis at surfaces and other surface reactions; A8245 Electrochemistry and electrophoresis; B8410G Fuel cells
- CT anodes; catalysts; chromium compounds; electrochemical

- electrodes; lanthanum compounds; solid oxide fuel cells
- ST anode materials; solid oxide fuel cells; methane; intermediary temperature; catalytic properties; natural gas fuel; steam reforming; gas chromatography; steam/carbon ratios; doped lanthanum chromites; gadolinium-doped ceria; praseodymium; molybdenum oxide; copper oxide; steam reforming efficiency; internal reforming; La1-xSrxCrO3; Ce0.9Gd0.102; 700 to 850 °C; La0.8Sr0.2Cr0.98Ru0.0203; La0.8Sr0.2Cr0.95Ru0.0503; La0.7Sr0.3Cr0.95Ru0.0503; Cu2O; La0.8Sr0.2Cr0.97V0.0303; Pr2O3; MoO3
- CHI Ce0.9Gd0.102 ss, Gd0.1 ss, O0.9 ss, Ce ss, Gd ss, O2 ss, O ss; La0.8Sr0.2Cr0.98Ru0.0203 ss, Cr0.98 ss, Ru0.02 ss, La0.8 ss, Sr0.2 ss, Cr ss, La ss, O3 ss, Ru ss, Sr ss, O ss; La0.8Sr0.2Cr0.95Ru0.0503 ss, Cr0.95 ss, Ru0.05 ss, La0.8 ss, Sr0.2 ss, Cr ss, La ss, O3 ss, Ru ss, Sr ss, O ss; La0.7Sr0.3Cr0.95Ru0.0503 ss, Cr0.95 ss, Ru0.05 ss, La0.7 ss, Sr0.3 ss, Cr ss, La ss, O3 ss, Ru ss, Sr ss, O ss; Cu2O bin, Cu2 bin, Cu bin, O bin; La0.8Sr0.2Cr0.97V0.0303 ss, Cr0.97 ss, La0.8 ss, Sr0.2 ss, V0.03 ss, Cr ss, La ss, O3 ss, Sr ss, O ss, V ss; Pr2O3 bin, Pr2 bin, O3 bin, Pr bin, O bin; MoO3 bin, Mo bin, O3 bin, O bin
- PHP temperature 9.73E+02 to 1.12E+03 K
- ET Cr*O*Sr; Cr sy 3; sy 3; O sy 3; Sr sy 3; SrxCrO3; Sr cp; cp; Cr cp; O cp; Gd*O; O0.9Gd0.102; Gd cp; Cr*O*Ru*Sr; Cr sy 4; sy 4; O sy 4; Ru sy 4; Sr sy 4; Sr0.2Cr0.98Ru0.0203; Ru cp; Sr0.2Cr0.95Ru0.0503; Sr0.3Cr0.95Ru0.0503; Cr*O*Sr*V; V sy 4; Sr0.2Cr0.97V0.0303; V cp; O0.9Gd0.10; Gd; O; Ce; Sr0.2Cr0.98Ru0.020; Cr; Ru; La; Sr; Sr0.2Cr0.95Ru0.050; Sr0.3Cr0.95Ru0.050; Cu; Sr0.2Cr0.97V0.030; V; Pr; Mo; Ce*Gd*O; Ce sy 3; Gd sy 3; Ce0.9Gd0.102; Ce cp; CeGdO2; C; Cr*La*O*Sr; La sy 4; La1-xSrxCrO3; La cp
- L72 ANSWER 11 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN
- AN 2002:33462 HCAPLUS Full-text
- DN 136:312358
- ED Entered STN: 13 Jan 2002
- TI Impedance studies on chromite-titanate porous electrodes under reducing conditions
- AU Gonzalez-Cuenca, M.; Zipprich, W.; Boukamp, B. A.; Pudmich, G.; Tietz, F.
- CS Laboratory for Inorganic Materials Science, Dept. of Chemical Technology and MESA Research Institute, Enschede, 7500 AE, Neth.
- SO Fuel Cells (2001), 1(3-4), 256-264
- CODEN: FUCEFK; ISSN: 1615-6846
- PB Wiley-VCH Verlag GmbH
- DT Journal
- LA English
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
- AB Two types of lanthanum-based chromite-titanate perovskite materials were tested for use as porous ceramic anodes in SOFC (solid oxide fuel cell) applications. The calcium-doped or strontium-doped chromium-rich materials, with composition La0.7A0.3Cr0.8Ti0.2O3-δ (A = Ca, Sr), showed p-type conductivity under reducing conditions. In contrast, the titanium-rich composition, La0.7Ca0.3Cr0.2Ti0.8O3-δ, showed n-type conductivity. Both type of materials were active electrodes in a H2/H2O gas mixture at 850°. The electron conductivity became an important limiting factor when the electrode thickness was reduced from 100 μm to 20 μm. For the 20 μm thin-layer electrodes, a dominant (fractal) Gerischer type response was observed in the electrode dispersion. The high-frequency "cut-off" resistance showed a significant dependence on PO2, similar to that found for the electronic conductivity. This effect could be attributed to a limiting sheet resistance of the electrodes. The ceramic electrodes were quite stable and reproducible.
- ST elec impedance cond chromite titanate ceramic electrode; fuel cell

- chromite titanate ceramic electrode; perovskite chromite titanate ceramic electrode fuel cell
- IT Perovskite-type crystals
(ceramic, electrodes; impedance studies on chromite-titanate porous electrodes under reducing conditions for solid oxide fuel cells)
- IT Fuel cell electrodes
(ceramic, perovskites; impedance studies on chromite-titanate porous electrodes under reducing conditions for solid oxide fuel cells)
- IT Ceramics
(electrodes; impedance studies on chromite-titanate porous electrodes under reducing conditions for solid oxide fuel cells)
- IT Electric conductivity
Electric conductors, ceramic
Electric impedance
(impedance studies on chromite-titanate porous electrodes under reducing conditions for solid oxide fuel cells)
- IT Fuel cells
(solid oxide, hydrogen-fueled; impedance studies on chromite-titanate porous electrodes under reducing conditions for solid oxide fuel cells)
- IT 241138-34-1, Calcium chromium lanthanum titanium oxide (Ca_{0.3}Cr_{0.8}La_{0.7}Ti_{0.2}O₃) 241138-35-2, Chromium lanthanum strontium titanium oxide (Cr_{0.8}La_{0.7}Sr_{0.3}Ti_{0.2}O₃) 313221-57-7, Calcium chromium lanthanum titanium oxide (Ca_{0.3}Cr_{0.2}La_{0.7}Ti_{0.8}O₃)
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(perovskite, oxygen-deficient; impedance studies on chromite-titanate porous electrodes under reducing conditions for solid oxide fuel cells)

RE.CNT 19 THERE ARE 19 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

- (1) Adler, S; Solid State Ionics 1998, V111, P125 HCAPLUS
- (2) Biebler, A; PhD Thesis, ETH Zurich 2000
- (3) Boukamp, B; Equivalent Circuit, Users Manual 1989, report CT89/214/128
- (4) Boukamp, B; J Electrochemical Society 1995, V142, P1885 HCAPLUS
- (5) Boukamp, B; Solid State Ionics 1986, V18-19, P136 HCAPLUS
- (6) Boukamp, B; Solid State Ionics 1986, V20, P31 HCAPLUS
- (7) de Boer, B; PhD Thesis, Twente University 1998
- (8) Havriliak, S; Polymer 1967, V8, P161 HCAPLUS
- (9) Inoue, T; Solid State Ionics 1991, V48, P283 HCAPLUS
- (10) Kharton, V; J Solid State Electrochemistry 1999, V3, P303 HCAPLUS
- (11) Koide, H; Solid State Ionics 2000, V132, P253 HCAPLUS
- (12) Manner, R; SOFC 1991, VII(EUR-13564-EN), P715
- (13) Minh, N; Science and Technology of Ceramic Fuel Cells 1995
- (14) Pechini, M; US 3697 1967
- (15) Pudmich, G; Solid State Ionics 2000, V135-137, P433
- (16) Ross Macdonald, J; Impedance Spectroscopy 1987
- (17) Sakai, N; J Materials Science 1990, V25, P4531 HCAPLUS
- (18) Sluyters-Rehbach, M; Comprehensive Treatise of Electrochemistry 1984, V9, P274
- (19) Valdes, L; Proc IRE 1954, V42, P420

L72 ANSWER 12 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 2002:33458 HCAPLUS Full-text

DN 136:312355

ED Entered STN: 13 Jan 2002

KATHLEEN FULLER EIC1700 571/272-2505

TI Combustion synthesis of alternative Cu-GCO anodes for SOFCs, and cofiring of electrolyte-anode bilayers at reduced temperatures

AU Mather, G. C.; Fagg, D. P.; Ringuede, A.; Frade, J. R.

CS Departamento da Ceramica e do Vidro, Universidade de Aveiro, Aveiro, 3810-193, Port.

SO Fuel Cells (2001), 1(3-4), 233-237
CODEN: FUCEFK; ISSN: 1615-6846

PB Wiley-VCH Verlag GmbH

DT Journal

LA English

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

AB CuO-GCO powders have been prepared by combustion synthesis, co-pressed onto a green GCO layer, co-sintered, and then reduced to obtain Cu-GCO cermet anodes for SOFCs. Cermet with Cu contents from 20 to 50 volume% were synthesized. The anode precursor powder obtained by combustion synthesis is a composite of CuO and GCO, with a nano-scaled GCO grain size. The green GCO substrate (Gd_{0.2}Ce_{0.8}O_{2-δ}) was prepared from com. powders, with a sintering additive added as cobalt nitrate solution, to be able to sinter the bilayered samples at 1000C or lower. On reduction in 10%H₂-90%N₂ in a temperature range of 600-800C, the anode is reduced to porous Cu-GCO cermet with good adherence to the dense GCO electrolyte layer. Van der Pauw d.c. conductivity measurements on Cu-GCO cermets with varying Cu contents indicate that a Cu content of 40 volume% is beyond the percolation limit for metallic conductivity

ST fuel cell anodes copper oxide cerium gadolinium oxide cermet

IT Cermet
Fuel cell anodes
(combustion synthesis of alternative Cu-GCO anodes for SOFCs, and cofiring of electrolyte-anode bilayers at reduced temps.)

IT 1317-38-0, Copper monoxide, processes 136854-58-5, Cerium gadolinium oxide (Ce_{0.8}Gd_{0.2}O₂)
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(combustion synthesis of alternative Cu-GCO anodes for SOFCs, and cofiring of electrolyte-anode bilayers at reduced temps.)

RE.CNT 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

- (1) Cracium, R; J Electrochem Soc 1999, V146, P4019
- (2) Dees, D; J Electrochem Soc 1987, V134, P9
- (3) Kleinlogel, C; Proc SOFC VI 1999, V99-19 HCAPLUS
- (4) Kleinlogel, C; Solid State Ionics 2000, V135, P567 HCAPLUS
- (5) Lewis, G; IEA Annex XIII SOFC Proceedings 2000
- (6) Marina, O; Solid State Ionics 1999, V123, P199 HCAPLUS
- (7) Park, S; Nature 2000, V404, P265 HCAPLUS
- (8) Putna, E; Langmuir 1995, V11, P4832 HCAPLUS
- (9) Ringuede, A; Ionics 2000, V6, P273 HCAPLUS
- (10) Ringuede, A; Solid State Ionics 2001, V141/142, P549
- (11) Steele, B; Solid State Ionics 2000, V129, P95 HCAPLUS
- (12) Trovarelli, A; Catal Rev Sci Eng 1996, V38, P439 HCAPLUS
- (13) Tsoga, A; Solid State Ionics 2000, V135, P403 HCAPLUS

L72 ANSWER 13 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 2002:33455 HCAPLUS Full-text

DN 136:328015

ED Entered STN: 13 Jan 2002

- TI Preparation and characterization of copper/yttria titania zirconia
cermets for use as possible solid oxide
fuel cell anodes
- AU Kiratzis, N.; Holtappels, P.; Hatchwell, C. E.; Mogensen, M.; Irvine, J.
T. S.
- CS TEI of W. Macedonia, Kozani, Greece
- SO Fuel Cells (2001), 1(3-4), 211-218
CODEN: FUCEFK; ISSN: 1615-6846
- PB Wiley-VCH Verlag GmbH
- DT Journal
- LA English
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy
Technology)
- AB The potential of a new anode cermet based on Cu and titania doped yttria
stabilized zirconia (YSZ) for high temperature fuel cells was examined
Cermets were prepared by a standard solid-state reaction with
Y0.2Ti0.18Zr0.62O1.9 and CuO as starting materials. Green pellets were
sintered at 1000 C for 10 h resulting in sound pellets. These were
successfully reduced in 5% H2 in Ar again yielding sound pellets with a
porosity of 50%. These were characterized by SEM, XRD and TGA methods and
their conductivity measured by ac impedance and the 4 point DC method as a
function of both temperature and oxygen partial pressure. On sintering there
was evidence of a small amount of reaction between CuO and YSZ. This resulted
in a slight tetragonal distortion of YSZ; however, most of the copper oxide
was not incorporated into the zirconia. The cermet was successfully redox
cycled and percolation was achieved when the copper composition exceeded 33%
of the volume Conductivity remains high under a wide range of oxygen partial
pressures from the most reducing conditions up to 10-4 atm O2. Electrochem.
testing performed using three-electrode geometry showed good performance for
hydrogen oxidation for temps. up to 800C. At higher temps. up to 1000C copper
was observed to be very mobile with considerable agglomeration of metallic
copper particles. Indeed in some instances there was a total segregation of
copper from YSZ resulting in a copper layer forming at the electrolyte
interface with the outer layer of the electrode being essentially YSZ. This
agglomeration and migration of Cu led to a significant degradation in
electrochem. performance with large increases in the series resistance and
polarization resistance, especially under anodic bias. Due to these
segregation problems copper based cermets produced in this manner are not good
candidates for fuel cell electrodes operating at 1000 C.
- ST solid oxide fuel cell
anodes copper yttria titania zirconia
- IT Fuel cell anodes
(preparation and characterization of copper/yttria titania zirconia
cermets for use as possible solid oxide
fuel cell anodes)
- IT Fuel cells
(solid oxide; preparation and characterization of
copper/yttria titania zirconia cermets for use as
possible solid oxide fuel cell
anodes)
- IT 1314-21-4, Zirconia, processes 1314-36-9,
Yttria, processes 1317-38-0, Copper monoxide, processes 7440-50-8,
Copper, processes 13463-67-7, Titania, processes 221326-79-0, Titanium
yttrium zirconium oxide (Ti0.18Y0.22Zr0.62O1.9)
RL: PEP (Physical, engineering or chemical process); PRP (Properties);
PROC (Process)
(preparation and characterization of copper/yttria titania zirconia
cermets for use as possible solid oxide
fuel cell anodes)
- RE.CNT 10 THERE ARE 10 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

- (1) Fagg, D; Ionics 1998, V4, P61 HCAPLUS
(2) Feighery, A; Solid State Chem 1999, V143, P273 HCAPLUS
(3) Gibson, I; J Mater Chem 1996, V6, P895 HCAPLUS
(4) Holtappels, P; J Electrochem Soc, in press
(5) Kaiser, A; Ionics 1998, V4, P215 HCAPLUS
(6) Kaiser, A; submitted to Solid State Ionics
(7) Kim, H; J Electrochem Soc 2001, V148, P693
(8) Park, S; Nature 2000, V404, P265 HCAPLUS
(9) Primdahl, S; J Electrochem Soc 1999, V146, P2827 HCAPLUS
(10) Winkler, J; J Electrochem Soc 1998, V145, P1184 HCAPLUS

L72 ANSWER 14 OF 89 INSPEC (C) 2008 IET on STN
AN 2001:6856414 INSPEC DN A2001-07-8630G-023; B2001-04-8410G-030 Full-

text

- TI A complete polarization model of a solid oxide
fuel cell and its sensitivity to the change of cell
component thickness
AU Chan, S.H.; Khor, K.A.; Xia, Z.T. (Fuel Cell Res. Group, Nanyang Technol.
Inst., Singapore)
SO Journal of Power Sources (1 Feb. 2001), vol.93, no.1-2, p. 130-40, 11
refs.
CODEN: JPSODZ, ISSN: 0378-7753
SICI: 0378-7753(20010201)93:1/2L:130:CPMS;1-V
Price: 0378-7753/2001/\$20.00
Doc.No.: S0378-7753(00)00556-5
Published by: Elsevier, Switzerland
DT Journal
TC Theoretical
CY Switzerland
LA English
AB This paper presents a complete polarization model of a solid oxide fuel cell
(SOFC) that
eliminates the ambiguity of the suitability of such model when used under
different design and operating conditions. The Butler-Volmer equation is used
in the model to describe the activation overpotential instead of using
simplified expressions such as the Tafel equation and the linear current-
potential equation. In the concentration overpotential, both ordinary and
Knudsen diffusions are considered to cater for different porous electrode
designs. Sensitivity tests are then conducted to show the effect of the
thickness of the respective fuel cell components on the drop in cell voltage.
Results show that the performance of an anode-supported fuel cell is superior
to that using cathode as the support under elevated operating pressure in the
cathode compartment. The former can achieve an improved operating range of
current density under normal atmospheric conditions
CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; B8410G
Fuel cells
CT anodes; cathodes; current density; diffusion; electrochemical
electrodes; electrochemistry; polarisation; solid oxide fuel
cells; thermodynamics
ST solid oxide fuel cell; polarization model; cell component thickness;
SOFC; design conditions; operating conditions; Butler-Volmer equation;
activation overpotential; Knudsen diffusion; porous electrode designs;
anode-supported fuel cell; electrochemical performance; elevated
operating pressure; current density

L72 ANSWER 15 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN
AN 2001:437282 HCAPLUS Full-text
DN 135:213384
ED Entered STN: 18 Jun 2001

- TI Phenomenological theory of solid oxide fuel cell anode
- AU Toselevich, A. S.; Kornyshev, A. A.
- CS IWV-3, Forschungszentrum Julich, Julich, D-52425, Germany
- SO Fuel Cells (2003), 1(1), 40-65
CODEN: FUCEPK; ISSN: 1615-6846
- PB Wiley-VCH Verlag GmbH
- DT Journal
- LA English
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72
- AB We develop a phenomenol. theory of oxygen-ion-conducting porous cermet anode for solid oxide fuel cells utilizing hydrogen, based on a simple picture of macro- and microkinetics of charge and gas transport in the cermet. Its basic equations account for the transport of hydrogen mols. and oxygen anions to the reaction spots, the hydrogen oxidation reaction (whose various mechanisms, including different adsorption stages, are considered) and the water-product removal. Simple anal. results are obtained for a linear current-voltage-regime, which demonstrate the interplay of these three processes. The nonlinear behavior is analyzed and classified. Various mechanisms of reaction kinetics are considered, subject to three possible mechanisms of water adsorption, in order to specify the law of conversion of ionic current into electronic one. Revealed is the nature of the intermediate quasi-Tafel regime, in which the anode is usually employed, and of two possible large current regimes: the saturation regime and the blocking regime (due to oxidation of the anode). The study rationalizes principles of anode functioning and builds a basis for a systematic anal. of the effects due to composite structure, that enter through the basic parameters of the theory.
- ST phenomenol theory solid oxide fuel cell anode; hydrogen oxidn transport oxygen anion anode
- IT Transport properties
(ionic; phenomenol. theory of solid oxide fuel cell anode)
- IT Adsorption
Electric current-potential relationship
Fuel cell anodes
Ionic conductivity
Oxidation, electrochemical
(phenomenol. theory of solid oxide fuel cell anode)
- IT 1333-74-0, Hydrogen, uses
RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(phenomenol. theory of solid oxide fuel cell anode)
- RE.CNT 61 THERE ARE 61 CITED REFERENCES AVAILABLE FOR THIS RECORD
- RE
- (1) Aaberg, R; 17-th RISO Internat Symp 1996, P511 HCAPLUS
- (2) Aaberg, R; J Electrochem Soc 1998, V145, P2244 HCAPLUS
- (3) Abel, J; J Electrochem-Soc 1997, V144, P4253 HCAPLUS
- (4) Adams, R; Electrochemistry at Solid Electrodes, (Chapter 7) 1969
- (5) Adler, S; J Electrochem Soc 1996, V143, P3554 HCAPLUS
- (6) Anon; Private communication from I Vinke
- (7) Anon; Private communication from M Mogensen
- (8) Bird, R; Transport Phenomena 1960
- (9) Blomen, L; Fuel Cell Systems 1993
- (10) Bockris, J; Surface Electrochemistry, (Chapter 8) 1993

- (11) Brown, M; J Electrochem Soc 2000, V147, P475 HCAPLUS
(12) Callen, B; J Chem Phys 1992, V97, P3760 HCAPLUS
(13) Christmann, K; J Chem Phys 1974, P4528 HCAPLUS
(14) Christmann, K; Surf Sci Rep 1988, V9, P1
(15) Conway, B; Comprehensive Treatise of Electrochemistry 1983, V7
(16) Costamagna, P; Electrochim Acta 1998, V43, P375 HCAPLUS
(17) Damaskin, B; Introduction to Electrochemical Kinetics, Chapter 4 1975
(18) de Boer, B; Thesis, University of Twente 1998
(19) Divisek, J; J Appl Electrochem 1999, V29, P165 HCAPLUS
(20) Divisek, J; J Appl-Electrochem 1999, V29, P153 HCAPLUS
(21) Eguchi, K; J Electrochem Soc 1996, V143, P3699 HCAPLUS
(22) Erdey-Gruz, T; Kinetics of Electrode Processes, (Chapter 7) 1972
(23) Frank, U; Z phys Chem 1955, V3, P183
(24) Frumkin, A; Zh fiz Khim 1949, V23, P1477 HCAPLUS
(25) Gileadi, E; Electrode Kinetics for Chemists, Chemical Engineers and Material Scientists 1993
(26) Gileadi, E; Interfacial Electrochemistry, (Chapter 11) 1975
(27) Holtappels, P; (Dissertation, Uni Bonn) 1997
(28) Holtappels, P; J Electrochem Soc 1620, V146, P1999
(29) Ioselevich, A; J Electrochem Soc 1997, V144, P3010
(30) Ioselevich, A; Solid State Ionics 1999, V124, P221 HCAPLUS
(31) Jensen, K; to be published
(32) Kawada, T; Proc High Temp Mat & Charct 1991, V91-6, P165 HCAPLUS
(33) Kenjo, T; J Electrochem Soc 1991, V138, P349 HCAPLUS
(34) Krishtalik, L; Charge Transfer Reaction in Electrochemical and Chemical Processes 1986
(35) Kuznetsov, A; Charge Transfer in Physics, Chemistry and Biology 1995
(36) Kuznetsov, A; Electron Transfer in Chemistry and Biology 1999
(37) Lehnert, W; Elektrochemische Verfahrenstechnik 1996, P197
(38) Levich, V; DAN SSSR 1960, V134, P380 HCAPLUS
(39) Levich, V; DAN SSSR 1966, V167, P147 HCAPLUS
(40) Minch, N; J Am Ceram Soc 1993, V76, P563
(41) Mizusaki, J; J Electrochem Soc 1994, V141, P2129 HCAPLUS
(42) Mogensen, M; 17th RISO Int Symp 1996, P77 HCAPLUS
(43) Mogensen, M; 17th RISO Internat Symp 1996, P77 HCAPLUS
(44) Mogensen, M; Proc 2d Internat Symp SOFC 1993, V93-4, P484 HCAPLUS
(45) Montenegro, I; Microelectrodes, NATO ASI Series, E: Applied Sciences 1990, V197
(46) Nakagawa, N; J Electrochem Soc 1995, V142, P3474 HCAPLUS
(47) Newman, J; Electrochemical Systems, II Edition 1991
(48) Pirou, G; Surf Sci 1994, V321, P58 HCAPLUS
(49) Pismen, L; DAN SSSR 1966, V167, P430
(50) Prindahl, S; J Electrochem Soc 1997, V144, P3409 HCAPLUS
(51) Prindahl, S; J Electrochem Soc 1999, V146, P2827 HCAPLUS
(52) Rideal, E; Proc Roy Soc 1960, VA257, P291
(53) Satterfield, N; Mass Transfer in heterogeneous catalysis 1970
(54) Smilga, V; DAN SSSR 1960, V133, P633 HCAPLUS
(55) Somorjai, G; Introduction to surface chemistry and catalysis 1994
(56) Sunde, S; J Electrochem Soc 1996, V143, P1930 HCAPLUS
(57) Thiel, P; Surf Sci Rep 1987, V7, P211 HCAPLUS
(58) Thomas, J; Principles and Practice of Heterogeneous Catalysis 1997
(59) Ya, A; DAN SSSR 1960, V132, P388
(60) Yu, A; DAN SSSR 1960, V133, P1136
(61) Yu, A; Macro-Kinetics of Processes in Porous Media (Fuel Cells) 1971

L72 ANSWER 16 OF 89 INSPEC (C) 2008 IET on STN

AN 2001:6877524 INSPEC DN A2001-09-8630G-005; B2001-05-8410G-005 Full-text

TI Performance of a solid oxide fuel cell utilizing hydrogen sulfide as fuel

- AU Liu, M.; He, P.; Luo, J.L.; Sanger, A.R.; Chuang, K.T. (Dept. of Chem. & Mater. Eng., Alberta Univ., Edmonton, Alta., Canada)
- SO Journal of Power Sources (15 Feb. 2001), vol.94, no.1, p. 20-5, 17 refs.
CODEN: JPSODZ, ISSN: 0378-7753
SICI: 0378-7753(20010215)94:1L:20:PSOF;1-M
Price: 0378-7753/2001/\$20.00
Doc.No.: S0378-7753(00)00660-1
Published by: Elsevier, Switzerland
- DT Journal
- TC Experimental
- CY Switzerland
- LA English
- AB The electrochemical performance of a hydrogen sulfide solid oxide fuel cell having the configuration H₂S, Pt/(ZrO₂)0.92(Y₂O₃)0.08/Pt, air has been examined at atmospheric pressure and 750-800°C, using both pure and 5% H₂S anode feed streams. The performance of the cell is higher when using diluted H₂S feed compared with pure H₂S feed: current densities up to 100 mA cm⁻² and power densities up to 15.4 mW cm⁻² have been achieved using diluted H₂S gas (5%) at 800°C. However, the platinum anode degrades over time in H₂S stream due to the formation of PtS. Electrochemical oxidation of H₂S on the Pt anode significantly accelerated its degradation. Polarization and impedance spectroscopy measurements show that at low current density (i) electrochemical reaction is the major cause of polarization in the fuel cell. Ohmic loss due to the resistance of the electrolyte material and the electrical connecting wire is a major part of cell polarization at high i
- CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; A8230 Specific chemical reactions; reaction mechanisms; B8410G Fuel cells; B7310J Impedance and admittance measurement
- CT anodes; current density; electric impedance measurement; electrolytes; fuel; hydrogen compounds; losses; oxidation; polarisation; solid oxide fuel cells; spectroscopy
- ST solid oxide fuel cell; hydrogen sulfide fuel; H₂S fuel; Pt/(ZrO₂)0.92(Y₂O₃)0.08/Pt fuel cell; atmospheric pressure; H₂S anode feed stream; diluted H₂S feed; current densities; power densities; platinum anode degradation; impedance spectroscopy measurements; polarization measurements; electrochemical reaction; ohmic loss; electrolyte material resistance; electrical connecting wire; cell polarization; 750 to 800 C; 1013 mbar; H₂S; Pt-(ZrO₂)0.92(Y₂O₃)0.08-Pt; PtS
- CHI H₂S bin, H₂ bin, H bin, S bin; Pt-ZrO₂Y₂O₃-Pt int, ZrO₂Y₂O₃ int, O₂ int, O₃ int, Pt int, Y₂ int, Zr int, O int, Y int, ZrO₂Y₂O₃ ss, O₂ ss, O₃ ss, Y₂ ss, Zr ss, O ss, Y ss, Pt el; PtS bin, Pt bin, S bin
- PHP temperature 1.02E+03 to 1.07E+03 K; pressure 1.013E+05 Pa
- ET O*Y*Zr; O sy 3; sy 3; Y sy 3; Zr sy 3; (ZrO₂)0.92(Y₂O₃)0.08; Zr cp; cp; O cp; Y cp; H*S; H₂S; H cp; S cp; S; H; ZrO₂Y₂O₃; Pt; O; Y; Zr; C; Pt*S; PtS; Pt cp
- L72 ANSWER 17 OF 89 INSPEC (C) 2008 IET on STN
- AN 2001:7009147 INSPEC DN A2001-18-8630G-020; B2001-09-8410G-071 Full-text
- TI Tape cast solid-oxide fuel cells for the direct oxidation of hydrocarbons
- AU Seungdoo Park; Gorte, R.J.; Vohs, J.M. (Dept. of Chem. Eng., Univ. of Pennsylvania, Philadelphia, PA, USA)
- SO Journal of the Electrochemical Society (May 2001), vol.148, no.5, p. A443-7, 10 refs.
CODEN: JESOAN, ISSN: 0013-4651
SICI: 0013-4651(200105)148:5L:A443:TCSS;1-C
Price: 0013-4651/2001/148(5)/443/5/\$7.00
Doc.No.: S0013-4651(01)02905-6

- Published by: Electrochem. Soc, USA
- DT Journal
- TC Application; Experimental
- CY United States
- LA English
- AB A tape casting method for fabricating solid-oxide fuel cells (SOFCs) that are active for the direct oxidation of dry hydrocarbons is presented. The method relies on the inclusion of pyrolyzable pore formers in the anode green tape in order to produce a porous yttria-stabilized zirconia anode matrix. Wet impregnation was used to add both a metal current collector and an oxidation catalyst to the anode. The performance characteristics for cells produced using this method while operating on H₂, CH₄, and C₄H₁₀ are presented
- CC A8630G Fuel cells; A8130F Solidification; A8230L Decomposition reactions (pyrolysis, dissociation, and group ejection); A8245 Electrochemistry and electrophoresis; A8120E Powder techniques, compaction and sintering; A8120L Preparation of ceramics and refractories; B8410G Fuel cells; B0170G General fabrication techniques; B0540 Ceramics and refractories (engineering materials science); E1520G Forming processes; E1520J Powder technology; E1710 Engineering materials
- CT anodes; casting; electrochemical electrodes; oxidation; porous materials; pyrolysis; sintering; solid oxide fuel cells
- ST tape casting; solid-oxide fuel cells; direct oxidation; SOFC; dry hydrocarbons; pyrolyzable pore formers; anode green tape; porous YSZ anode matrix; wet impregnation; metal current collector; oxidation catalyst; performance characteristics; H₂; CH₄; C₄H₁₀; Y₂O₃ZrO₂
- CHI Y₂O₃ZrO₂ int, O₂ int, O₃ int, Y₂ int, Zr int, O int, Y₂O₃ZrO₂ ss, O₂ ss, O₃ ss, Y₂ ss, Zr ss, O ss, Y ss
- ET O*Zr; O₃ZrO₂; O cp; Zr cp; O₃ZrO; O; Y; Zr; O*Y*Zr; O sy 3; sy 3; Y sy 3; Zr sy 3; Y₂O₃ZrO; Y cp; Cs*F*O*S; SOFCs; S cp; F cp; Cs cp; H₂; C*H; CH₄; C cp; H cp; C₄H₁₀
- L72 ANSWER 18 OF 89 INSPEC (C) 2008 IET on STN
- AN 2001:7008903 INSPEC DN A2001-18-8630G-012; B2001-09-8410G-061 Full-text
- TI Sr-Doped LaCrO₃ anode for solid oxide fuel cells
- AU Primdahl, S.; (Riso Nat. Lab., Roskilde, Denmark), Hansen, J.R.; Grahl-Madsen, L.; Larsen, P.H.
- SO Journal of the Electrochemical Society (Jan. 2001), vol.148, no.1, p. A74-81, 36 refs.
CODEN: JESQAN, ISSN: 0013-4651
SICI: 0013-4651(200101)148:1L;1-L;1-74:DLAS;1-H
Price: 0013-4651/2001/148(1)/74/8/\$7.00
Doc.No.: S0013-4651(01)01301-5
Published by: Electrochem. Soc, USA
- DT Journal
- TC Experimental
- CY United States
- LA English
- AB A number of doped lanthanum chromite perovskites are considered as anode materials for solid oxide fuel cells with an yttria-stabilized zirconia (YSZ) electrolyte operating in hydrogen at 850°C. The polarization resistance is measured by impedance spectroscopy, and shown to depend significantly on the type and amount of doping. In particular, the composition La_{0.8}Sr_{0.2}Cr_{0.9}Ti_{0.1}O₃ (LSCV) is examined in detail. Reactivity studies indicate the presence of secondary phases in LSCV. These phases are reactive toward YSZ, resulting in the formation of SrZrO₃. The secondary phases may be readsorbed during prolonged calcination under reducing conditions. The polarization resistance is shown to increase severely over a few days, and to be recoverable by temporary oxidation. The time constant of the degradation

is shown not to match that of the changes in stoichiometry and conductivity during reduction of the perovskite. Two rate limiting processes are generally observed. The low frequency process is suggested to relate to adsorption of hydrogen on the LSCV surface or a chemical reaction step. The high frequency process is suggested to relate to the LSCV/YSZ contact interface. LSCV does not exhibit significant catalytic activity toward steam reforming of methane, and shows no sign of direct methane oxidation

CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; A8265J Heterogeneous catalysis at surfaces and other surface reactions; B8410G Fuel cells

CT anodes; catalysis; chemical reactions; chromium compounds; electrochemical electrodes; lanthanum compounds; oxidation; solid electrolytes; solid oxide fuel cells; stoichiometry; strontium compounds; zirconium compounds

ST solid oxide fuel cells; Sr-doped LaCrO3 anode; doped lanthanum chromite perovskites; anode materials; yttria-stabilized zirconia electrolyte; YSZ electrolyte; polarization resistance; impedance spectroscopy; doping; La0.8Sr0.2Cr0.97V0.03O3; reactivity studies; calcination; reducing conditions; temporary oxidation; time constant; stoichiometry; conductivity; perovskite reduction; two rate limiting processes; chemical reaction; high frequency process; catalytic activity; steam reforming; methane; 850 C; SrZrO3; ZrO2-Y2O3

CHI La0.8Sr0.2Cr0.97V0.03O3 ss, Cr0.97 ss, La0.8 ss, Sr0.2 ss, V0.03 ss, Cr ss, La ss, O3 ss, Sr ss, O ss, V ss; SrZrO3 ss, ZrO3 ss, O3 ss, Sr ss, Zr ss, O ss; ZrO2Y2O3 ss, O2 ss, O3 ss, Y2 ss, Zr ss, O ss, Y ss

PHP temperature 1.12E+03 K

ET Cr*La*O; Cr sy 3; sy 3; La sy 3; O sy 3; LaCrO3; La cp; cp; Cr cp; O cp; Cr*O*Sr*V; Cr sy 4; sy 4; O sy 4; Sr sy 4; V sy 4; Sr0.2Cr0.97V0.03O3; Sr cp; V cp; O*Zr; ZrO3; Zr cp; O*Y; Y2O3; Y cp; O2-Y2O3; Sr0.2Cr0.97V0.03O3; Cr; La; Sr; V; O; ZrO; Zr; O2Y2O; Y; C; Cr*La*O*Sr*V; Cr sy 5; sy 5; La sy 5; O sy 5; Sr sy 5; V sy 5; La0.8Sr0.2Cr0.97V0.03O3; O*Sr*Zr; Sr sy 3; Zr sy 3; SrZrO3

L72 ANSWER 19 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 2000:32618 HCAPLUS [Full-text](#)

DN 132:80917

ED Entered STN: 14 Jan 2000

TI Cermet electrode with increased active points for fuel cell and gas sensor and its manufacture

IN Nakamura, Kenichi; Sorita, Akifumi; Mochizuki, Hakaru; Takashima, Hiromasa

PA Tokyo Gas Co., Ltd., Japan; Yazaki Corp.

SO Jpn. Kokai Tokkyo Koho, 4 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM H01M004-86

ICS G01N027-409; H01M004-88

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 56, 79

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2000012042	A	20000114	JP 1998-178735	19980625 <--
PRAI	JP 1998-178735		19980625		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2000012042	ICM	H01M004-86
	ICS	G01N027-409; H01M004-88

- IPCI H01M0004-86 [ICM,7]; G01N0027-409 [ICS,7]; H01M0004-88 [ICS,7]
- IPCR G01N0027-409 [I,C*]; G01N0027-409 [I,A]; H01M0004-86 [I,C*]; H01M0004-86 [I,A]; H01M0004-88 [I,C*]; H01M0004-88 [I,A]
- AB The cermet electrode comprises a sintered porous material where Pt fine particles and Y2O3-stabilized ZrO2 (YSZ) fine particles are uniformly entangled each other. The electrode is manufactured by sintering a mixture of $\leq 0.6\text{-}\mu\text{m}$ Pt and $\leq 1\text{-}\mu\text{m}$ YSZ. The electrode shows high activity.
- ST cermet electrode increased activity fuel cell
; platinum yttria stabilized zirconia cermet electrode; sintering platinum YSZ porous anode fuel cell; solid electrolyte gas sensor cermet electrode; carbon monoxide gas sensor cermet electrode
- IT Gas sensors
(for CO; manufacture of cermet electrode with increased active points for fuel cell and gas sensor)
- IT Cermet
Fuel cell electrodes
(manufacture of cermet electrode with increased active points for fuel cell and gas sensor)
- IT 630-08-0, Carbon monoxide, analysis
RL: ANT (Analyte); ANST (Analytical study)
(manufacture of cermet electrode with increased active points for fuel cell and CO gas sensor)
- IT 253876-02-7, Platinum yttrium zirconium oxide
RL: DEV (Device component use); USES (Uses)
(manufacture of cermet electrode with increased active points for fuel cell and gas sensor)
- IT 7440-06-4, Platinum, processes 124697-64-9, Yttrium zirconium oxide (Y0.09Zr0.95O2.05)
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(manufacture of cermet electrode with increased active points for fuel cell and gas sensor)
- IT 1314-26-9, Yttria, processes
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(stabilizer; manufacture of cermet electrode with increased active points for fuel cell and gas sensor)
- IT 1314-23-4, Zirconia, processes
RL: PEP (Physical, engineering or chemical process); PROC (Process)
(yttria-stabilized; manufacture of cermet electrode with increased active points for fuel cell and gas sensor)
- L72 ANSWER 20 OF 89 INSPEC (C) 2008 IET on STN
- AN 2001:6801615 INSPEC DN A2001-03-8630G-017; B2001-02-8410G-019 Full-text
- TI Anodes for direct oxidation of dry hydrocarbons in a solid-oxide fuel cell
- AU Gorte, R.J.; Park Seungdoo; Vohs, J.M.; (Dept. of Chem. Eng., Pennsylvania Univ., Philadelphia, PA, USA); Wang Conghua
- SO Advanced Materials (2 Oct. 2000), vol.12, no.19, p. 1465-9, 41 refs.
CODEN: ADVMEW, ISSN: 0935-9648
SICI: 0935-9648(20001002)12:19L:1465:ADOH;1-N
Published by: VCH Verlagsgesellschaft, Germany
- DT Journal
- TC Experimental; Application; Practical; New Development
- CY Germany
- LA English
- AB Direct oxidation fuel cells are possible using Cu-based anodes. Recent research in this area is highlighted, and a new method for synthesizing thin-

- electrolyte, anode-supported cells - based on tape casting with graphite pore formers followed by impregnation with aqueous solutions of $\text{Cu}(\text{NO}_3)_2$ and $\text{Ce}(\text{NO}_3)_3$ - is described
- CC A8630G Fuel cells; A8120E Powder techniques, compaction and sintering; A8120L Preparation of ceramics and refractories; A8245 Electrochemistry and electrophoresis; B8410G Fuel cells; B0550 Composite materials (engineering materials science)
- CT anodes; casting; ceramics; copper compounds; scanning electron microscopy; sintering; solid electrolytes; solid oxide fuel cells; surface topography
- ST solid-oxide fuel cell; direct oxidation; dry hydrocarbons; anodes; tape casting; graphite pore formers; impregnation; hydrocarbon fuel; solid electrolytes; SEM; scanning electron microscopy; surface morphology; $\text{Cu}(\text{NO}_3)_2$; $\text{Ce}(\text{NO}_3)_3$
- CHI CuNO_3 ss, NO_3 ss, Cu ss, O₃ ss, N ss, O ss; CeNO_3 ss, NO_3 ss, Ce ss, O₃ ss, N ss, O ss
- ET N^*O ; $(\text{NO}_3)_2$; N cp; cp; O cp; $(\text{NO}_3)_3$; NO; Cu; O; Ce; $\text{Cu}^*\text{N}^*\text{O}$; $\text{Cu}(\text{NO}_3)_2$; Cu cp; $\text{Ce}^*\text{N}^*\text{O}$; $\text{Ce}(\text{NO}_3)_3$; Ce cp
- L72 ANSWER 21 OF 89 INSPEC (C) 2008 IET on STN
- AN 2000:6770716 INSPEC DN A2001-01-8630G-035; B2001-01-8410G-035 Full-text
- TI Performance relationships between SOFC systems and materials
- AU Batawi, E.; Doerk, T.; Keller, M.; Schuler, A.; (Sulzer HEXIS Ltd., Winterthur, Switzerland); Hager, C.
- SO Fourth European Solid Oxide Fuel Cell Forum. Proceedings, vol.2, 2000, p. 735-43 vol.2 of 2 vol. 988 pp., 3 refs.
Editor(s): McEvoy, A.J.
ISBN: 3 905592 04 5
Published by: European Fuel Cell Forum, Oberrohrdorf, Switzerland
Conference: Fourth European Solid Oxide Fuel Cell Forum. Proceedings, Lucern, Switzerland, 10-14 July 2000
Sponsor(s): Swiss Federal Office of Energy; Swiss Assoc. Gas Ind.; Swissair; Schweizerischer Nationalfonds
- DT Conference; Conference Article
- TC Experimental
- CY Switzerland
- LA English
- AB Research and development work in solid oxide fuel cells should be dictated by considerations on whether the materials used, or the operating conditions employed to test the components, make sense from a systems integration or economic viewpoint. Sulzer HEXIS has concentrated its R&D efforts towards the optimisation of cell characteristics that are dictated by cogeneration requirements for residential applications. Cell characteristics, such as performance stability in high electrical efficiency service conditions and anode stability in cyclically reducing and oxidising environments were considered of prime importance for the realisation of a reliable and market viable product. Much of the materials development work has focused on these issues. Furthermore, other aspects as the ability to operate with different fuels and fuel processing concepts or the improvement of the stability of the electrodes in sulphur containing environments are also being studied. Electrochemical characterisations of cell performance in stack tests simulate the spectrum of possible service conditions under which the SOFC system will operate. Performance maps based on voltage; power density and electrical efficiency give the necessary data to the systems engineer to better design the final product. The success of these materials development efforts has lead Sulzer HEXIS to construct a pilot plant dedicated to the manufacturing of these SOFC components. The plant will be designed for the deposition of HEXIS electrodes on commercially available electrolytes
- CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; B8410G

Fuel cells
 CT anodes; electrochemical electrodes; electrochemistry; electrolytes; solid oxide fuel cells; stability
 ST solid oxide fuel cells; SOFC systems; SOFC materials; performance relationships; R&D; Sulzer HEXIS; cogeneration requirements; residential applications; performance stability; anode stability; electrochemical characterisations; stack tests; electrolytes
 ET D

L72 ANSWER 22 OF 89 INSPEC (C) 2008 IET on STN
 AN 2000:6770698 INSPEC DN A2001-01-8630G-017; B2001-01-8410G-017 Full-text
 TI Catalytic properties of oxide-based anode for SOFC
 AU Sauvet, A.-L.; Guindet, J.; Fouletier, J. (Lab. d'Electrochimie et de Physico-Chimie des Mater. et des Interfaces, Saint Martin d'Heres, France)
 SO Fourth European Solid Oxide Fuel Cell Forum. Proceedings, vol.2, 2000, p. 567-77 vol.2 of 2 vol. 988 pp., 9 refs.
 Editor(s): McEvoy, A.J.
 ISBN: 3 905592 04 5
 Published by: European Fuel Cell Forum, Oberrohrdorf, Switzerland
 Conference: Fourth European Solid Oxide Fuel Cell Forum. Proceedings, Lucern, Switzerland, 10-14 July 2000
 Sponsor(s): Swiss Federal Office of Energy; Swiss Assoc. Gas Ind.; Swissair; Schweizerischer Nationalfonds
 DT Conference; Conference Article
 TC Experimental
 CY Switzerland
 LA English
 AB The trend in solid oxide fuel cell concerns the use of natural gas as fuel. One of the proposed processes is in situ natural gas steam reforming into hydrogen according to $\text{CH}_4 + \text{H}_2\text{O} \rightarrow \text{CO} + 3\text{H}_2$ followed by electrochemical oxidation of hydrogen on the anode $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O} + 2\text{e}^-$. The catalytic activities with respect to methane reforming of several powders, i.e., strontium and ruthenium doped lanthanum chromite (LSCr), strontium and vanadium doped lanthanum chromite (LSCV), copper oxide (CuO), gadolinia doped ceria oxide (CGO), praseodymium oxide (Pr2O3) and molybdenum oxide (MoO3) have been studied at 850°C. The experimental set-up allows methane reforming by gas chromatography to be followed and possible carbon deposition to be detected. The role of the steam-methane ratio on the catalyst performances has been studied
 CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; A8230 Specific chemical reactions; reaction mechanisms; A8280B Chromatography; A8265J Heterogeneous catalysis at surfaces and other surface reactions; B8410G Fuel cells
 CT anodes; catalysts; chromatography; electrochemical electrodes; hydrogen; oxidation; solid oxide fuel cells
 ST oxide-based anode; SOFC; catalytic properties; solid oxide fuel cell; natural gas fuel; in situ natural gas steam reforming; electrochemical oxidation; hydrogen; anode; catalytic activities; methane reforming; ruthenium doped lanthanum chromite; strontium doped lanthanum chromite; vanadium doped lanthanum chromite; copper oxide; CuO; gadolinia doped ceria oxide; praseodymium oxide; Pr2O3; molybdenum oxide; MoO3; gas chromatography; carbon deposition; steam-methane ratio; catalyst performances; 850 C; Ce0.6Gd0.4O1.8
 CHI CuO bin, Cu bin, O bin; Pr2O3 bin, Pr2 bin, O3 bin, Pr bin, O bin; MoO3 bin, Mo bin, O3 bin, O bin; Ce0.6Gd0.4O1.8 ss, Ce0.6 ss, Gd0.4 ss, O1.8 ss, Ce ss, Gd ss, O ss
 PHP temperature 1.12E+03 K
 ET Gd*O; Gd0.4O1.8; Gd cp; O cp; O; Cu; Pr; Mo; Gd0.4O; Ce; Gd; C*H*O; CH4; C cp; H cp; H2O; CH4+H2O; CO; CO+3H2; H*O; O in 2; in 2; H2+O2-;

Cu*O; CuO; Cu cp; O*Pr; Pr2O3; Pr cp; Mo*O; MoO3; Mo cp; C

L72 ANSWER 23 OF 89 INSPEC (C) 2008 IET on STN
AN 2000:6770694 INSPEC DN A2001-01-8630G-013; B2001-01-8410G-013 Full-text

TI Anodic behaviour of Y0.2Ti0.18Zr0.62O1.9 towards direct CH4 electro-oxidation in a high-temperature SOFC
AU Kelaidopoulou, A.; Siddie, A.; Dicks, A.L.; (Gas Res. & Technol. Centre, BG Technol. Ltd., Loughborough, UK), Kaiser, A.; Irvine, J.T.S.
SO Fourth European Solid Oxide Fuel Cell Forum. Proceedings, vol.2, 2000, p. 537-46 vol.2 of 2 vol. 988 pp., 25 refs.
Editor(s): McEvoy, A.J.
ISBN: 3 905592 04 5
Published by: European Fuel Cell Forum, Oberrohrdorf, Switzerland
Conference: Fourth European Solid Oxide Fuel Cell Forum. Proceedings, Lucern, Switzerland, 10-14 July 2000
Sponsor(s): Swiss Federal Office of Energy; Swiss Assoc. Gas Ind.; Swissair; Schweizerischer Nationalfonds
DT Conference; Conference Article
TC Experimental
CY Switzerland
LA English

AB The electrochemical oxidation of low humidity (3% H2O) methane and hydrogen were investigated on a Y0.2Ti0.18Zr0.62O1.9 (YTZ) anode in a high temperature planar solid oxide fuel cell. Direct current and AC impedance measurements were taken at different anodic overpotentials, fuel concentrations and temperatures in order to obtain details of the electrode reaction mechanism and assess the potential of YTZ as an anode for the direct electro-oxidation of methane. The power output of the cell fuel/YTZ/YSZ+Al2O3/Pt/air, used in this study, was extremely stable over a prolonged operation, 500 h. It amounted to more than 37 mW cm⁻² for 97%H2/3%H2O and 2 mW cm⁻² for 97%CH4/3%H2O at 932°C. Impedance data analysis showed that YTZ did not favour direct methane electro-oxidation under the employed experimental conditions. The main electrode reaction was rather the electro-oxidation of steam reformed methane. No carbon deposition was observed on the electrode
CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; B8410G Fuel cells
CT anodes; electrochemical electrodes; electrochemistry; electrolytes; oxidation; solid oxide fuel cells; titanium compounds; yttrium compounds; zirconium compounds
ST Y0.2Ti0.18Zr0.62O1.9 SOFC anodes; high-temperature SOFC; direct CH4 electro-oxidation; anodic behaviour; planar solid oxide fuel cells; electrochemical oxidation; AC impedance measurements; anodic overpotentials; fuel concentrations; impedance data analysis; direct methane electro-oxidation; 500 h; 932 C; Y0.2Ti0.18Zr0.62O1.9
CHI Y0.2Ti0.18Zr0.62O1.9 int, Ti0.18 int, Zr0.62 int, O1.9 int, Y0.2 int, Ti int, Zr int, O int, Y int, Y0.2Ti0.18Zr0.62O1.9 ss, Ti0.18 ss, Zr0.62 ss, O1.9 ss, Y0.2 ss, Ti ss, Zr ss, O ss, Y ss
PHP time 1.8E+06 s; temperature 1.2E+03 K
ET O*Ti*Zr; O sy 3; sy 3; Ti sy 3; Zr sy 3; Ti0.18Zr0.62O1.9; Ti cp; cp; Zr cp; O cp; C*H; CH4; C cp; H cp; Ti0.18Zr0.62O; Ti; Zr; O; Y; O*Ti*Y*Zr; O sy 4; sy 4; Ti sy 4; Y sy 4; Zr sy 4; Y0.2Ti0.18Zr0.62O; Y cp; Y0.2Ti0.18Zr0.62O1.9; H*O; H2O; Al*O; Al2O3; Al cp; H2; C

L72 ANSWER 24 OF 89 INSPEC (C) 2008 IET on STN
AN 2001:6849926 INSPEC DN A2001-07-8630G-006; B2001-04-8410G-009 Full-text

TI Tetragonal tungsten bronze type phases (Sr1-xBax)0.6Ti0.2Nb0.8O3-δ: material characterisation and performance as SOFC anodes

- AU Kaiser, A.; Bradley, J.L.; Slater, P.R.; Irvine, J.T.S. (Sch. of Chem., St. Andrews Univ., UK)
- SO Solid State Ionics, Diffusion & Reactions (Nov. 2000), vol.135, no.1-4, p. 519-24, 7 refs.
CODEN: SSIOD3, ISSN: 0167-2738
SICI: 0167-2738(200011)135:1/4L519:TTBT;1-0
Price: 0167-2738/2000/\$20.00
Doc.No.: S0167-2738(00)00432-X
Published by: Elsevier, Netherlands
Conference: 12th International Conference on Solid State Ionics, Halkidiki, Greece, 6-12 June 1999
Sponsor(s): Minstr. Cultural Affairs; Minstr. Educ.; Minstr. Macedonia & Thrace; Gen. Secretariat of Res. & Technol.; et al
Conference; Conference Article; Journal
- DT Experimental
- CY Netherlands
- LA English
- AB The oxide material $\text{Sr}_{0.2}\text{Ba}_{0.4}\text{Ti}_{0.2}\text{Nb}_{0.8}\text{O}_{3.0}$ was investigated for application as a potential anode material in solid oxide fuel cells (SOFCs). Impedance spectroscopy in air and DC conductivity measurements under varying oxygen partial pressure revealed high electronic conductivity of 10 S cm^{-1} [$p(\text{O}_2)=10\text{--}20 \text{ atm}$ and 930°C]. Additionally these anode materials were tested in SOFC single cells. AC-impedance measurements under operation showed a Warburg type behaviour, which indicated a diffusion limited process. This diffusion limitation is most likely due to either low oxide ion conduction of the anode or due to a reaction layer formed during sintering of the anode onto the electrolyte at the relatively high temperatures of above 1250°C . Reactivity tests between YSZ electrolyte material and the $\text{Sr}_{0.2}\text{Ba}_{0.4}\text{Ti}_{0.2}\text{Nb}_{0.8}\text{O}_{3.0}$ anode up to 1300°C showed the formation of t-ZrO₂
- CC A8630G Fuel cells; B8410G Fuel cells
- CT anodes; electrolytes; solid oxide fuel cells
- ST tetragonal tungsten bronze type; solid oxide fuel cells; anode; conductivity; oxide ion conduction; electrolyte; 1250°C ; SrBaTiNbO
- CHI SrBaTiNbO ss, Ba ss, Nb ss, Sr ss, Ti ss, O ss
- PHP temperature $1.52\text{E}+03 \text{ K}$
- ET $\text{Ba}^*\text{Nb}^*\text{O}^*\text{Ti}$; Ba sy 4; sy 4; Nb sy 4; O sy 4; Ti sy 4; BaTiNbO ; Ba cp; cp; Ti cp; Nb cp; O cp; Ba; Nb; Sr; Ti; O; $\text{Ba}^*\text{Nb}^*\text{O}^*\text{Sr}^*\text{Ti}$; Ba sy 5; sy 5; Nb sy 5; O sy 5; Sr sy 5; Ti sy 5; ($\text{Sr}_{1-x}\text{Ba}_x$) $0.6\text{Ti}_{0.2}\text{Nb}_{0.8}\text{O}_{3.0}$; Sr cp; $\text{Sr}_{0.2}\text{Ba}_{0.4}\text{Ti}_{0.2}\text{Nb}_{0.8}\text{O}_{3.0}$; $\text{Cs}^*\text{F}^*\text{O}^*\text{S}$; SOFCs; S cp; F cp; Cs cp; S; C; O^*Zr ; ZrO_2 ; Zr cp
- L72 ANSWER 25 OF 89 INSPEC (C) 2008 IET on STN
- AN 2000:6783888 INSPEC DN A2001-02-8630G-078; B2001-01-8410G-139 Full-text
- TI Operating point analyses for solid oxide fuel cell energy systems
- AU Braun, R.J.; Klein, S.A.; Reindl, D.T. (Solar Energy Lab., Wisconsin Univ., Madison, WI, USA)
- SO Fourth European Solid Oxide Fuel Cell Forum. Proceedings, vol.1, 2000, p. 459-68 vol.1 of 2 vol. 988 pp., 15 refs.
Editor(s): McEvoy, A.J.
ISBN: 3 905592 04 5
Published by: European Fuel Cell Forum, Oberrohrdorf, Switzerland
Conference: Fourth European Solid Oxide Fuel Cell Forum. Proceedings, Lucern, Switzerland, 10-14 July 2000
Sponsor(s): Swiss Federal Office of Energy; Swiss Assoc. Gas Ind.; Swissair; Schweizerischer Nationalfonds
- DT Conference; Conference Article
- TC Economic Aspects; Theoretical
- CY Switzerland

LA English

AB The successful design of fuel cell systems requires proper selection of stack operating conditions. Studies focusing on optimal operating point selection have only recently emerged. The operating point of the fuel cell in terms of performance variables, such as fuel utilization, operating voltage, and area specific resistance, will dictate the power density and operating efficiency of the stack module. In turn, establishment of these performance parameters enables a determination of capital, fuel, and electricity costs for a given utility requirement. The choice of the relevant performance parameters may maximize electric power, or electric efficiency. In this paper, optimal operating point analyses are performed for the purposes of establishing a system design through constrained optimization of the cost of electricity for an advanced planar solid oxide fuel cell system employing indirect internal reforming and anode gas recirculation. Sensitivity analyses of economic and cell performance parameters on operating point selection are presented. The system performance parameters varied include operating cell temperature, cell voltage, fuel utilization, and excess air. The sensitivity to variation of fuel and stack cost parameters is also presented. These analyses are important not only as design guides, but also in providing a framework for establishing a system operating and control strategies for building integrated solid oxide fuel cell applications

CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; B8410G Fuel cells; B0140 Administration and management; E0120 Management issues; E3624 Fuel processing industry

CT anodes; electrochemical electrodes; fuel; power generation economics; sensitivity analysis; solid oxide fuel cells

ST solid oxide fuel cell energy systems; operating point analyses; fuel cell systems; stack operating conditions; optimal operating point selection; performance variables; fuel utilization; operating voltage; area specific resistance; power density; operating efficiency; electricity costs; fuel costs; capital costs; electric power maximisation; electric efficiency maximisation; constrained optimization; planar solid oxide fuel cell system; indirect internal reforming; anode gas recirculation; sensitivity analyses; operating cell temperature; cell voltage; excess air

L72 ANSWER 26 OF 89 INSPEC (C) 2008 IET on STN

AN 2001:6836160 INSPEC DN A2001-06-8630G-019; B2001-03-8410G-021 Full-text

TI Kinetic parameters influencing the performance of IT-SOFC composite electrodes

AU Steele, B.C.H.; Hori, K.M.; Uchino, S. (Dept. of Mater., Imperial Coll. of Sci., Technol. & Med., London, UK)

SO Solid State Ionics, Diffusion & Reactions (Nov. 2000), vol.135, no.1-4, p. 445-50, 32 refs.

CODEN: SSIOD3, ISSN: 0167-2738

SICI: 0167-2738(200011)135:1/4L:445:KP1;1-Q

Price: 0167-2738/2000/\$20.00

Doc.No.: S0167-2738(00)00393-3

Published by: Elsevier, Netherlands

Conference: 12th International Conference on Solid State Ionics, Halkidiki, Greece, 6-12 June 1999

Sponsor(s): Minstr. Cultural Affairs; Minstr. Educ.; Minstr. Macedonia & Thrace; Gen. Secretariat of Res. & Technol.; et al

DT Conference; Conference Article; Journal

TC Experimental

CY Netherlands

LA English

AB Composite electrodes have made important contributions to the development of intermediate temperature solid oxide fuel cells (IT-SOFC). At a macroscopic

level, the separate electronic and ionic components can usefully be considered as a combined mixed conductor. This allows available kinetic data for oxygen self-diffusion ($D^* \text{ cm}^2 \text{ s}^{-1}$) and surface exchange ($k \text{ cm s}^{-1}$) coefficients to be evaluated so that possible rate-determining processes can be identified. For LSM/YSZ and LSCF/CGO composite electrodes it appears that the k values for YSZ and CGO have to be enhanced by at least two orders of magnitude to account for observed cathode ASR values. It is suggested that 'spillover' reactions involving the electronic component could be responsible for the increased rate of O_2 injection into YSZ and CGO. Additional strategies to further enhance the surface exchange rate for CGO at 500°C , such as doping with redox cations (e.g. $\text{Tb}^{4+}/\text{Tb}^{3+}$, $\text{Nb}^{5+}/\text{Nb}^{4+}$), changing the reduction enthalpy for $\text{Ce}^{4+}/\text{Ce}^{3+}$, and promotion with noble metal catalysts, are also discussed

- CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; B8410G Fuel cells; B0550 Composite materials (engineering materials science)
- CT anodes; cathodes; composite materials; electrochemical electrodes; electrochemistry; reaction kinetics; solid oxide fuel cells
- ST intermediate temperature solid oxide fuel cells; composite electrodes; kinetic parameters; electrochemical performance; SOFC; macroscopic level; combined mixed conductor; oxygen self-diffusion coefficient; surface exchange coefficient; area specific resistance; doping; redox cations; reduction enthalpy; noble metal catalysts; promotion; 500°C ; $\text{Ce}_0.8\text{Gd}_{0.2}\text{O}_{1.9}$; $\text{ZrO}_2\text{-Y}_2\text{O}_3$; LaSrMnO_3
- CHI $\text{Ce}_0.8\text{Gd}_{0.2}\text{O}_{1.9}$ int, $\text{Ce}_{0.8}$ int, $\text{Gd}_{0.2}$ int, $\text{O}_{1.9}$ int, Ce int, Gd int, O int, $\text{Ce}_0.8\text{Gd}_{0.2}\text{O}_{1.9}$ ss, $\text{Ce}_{0.8}$ ss, $\text{Gd}_{0.2}$ ss, $\text{O}_{1.9}$ ss, Ce ss, Gd ss, O ss; $\text{ZrO}_2\text{-Y}_2\text{O}_3$ int, Y_2O_3 int, ZrO_2 int, O2 int, O3 int, Y2 int, Zr int, O int, Y int, Y_2O_3 bin, ZrO_2 bin, O2 bin, O3 bin, Y2 bin, Zr bin, O bin, Y bin; LaSrMnO_3 int, La int, Mn int, O3 int, Sr int, O int, LaSrMnO_3 ss, La ss, Mn ss, O3 ss, Sr ss, O ss
- PHP temperature $7.73\text{E}+02 \text{ K}$
- ET Gd^0 ; $\text{Gd}_{0.2}\text{O}_{1.9}$; Gd cp; cp; O cp; O^*Y ; Y_2O_3 ; Y cp; $\text{O}_2\text{-Y}_2\text{O}_3$; $\text{Mn}^*\text{O}^*\text{Sr}$; Mn sy 3; sy 3; O sy 3; Sr sy 3; SrMnO_3 ; Sr cp; Mn cp; $\text{Gd}_{0.2}\text{O}_{1.9}$; Ce; Gd; O; Ce^*Gd^0 ; Ce sy 3; Gd sy 3; $\text{Ce}_0.8\text{Gd}_{0.2}\text{O}_{1.9}$; Ce cp; Y_2O_3 ; O^*Zr ; ZrO_2 ; Zr cp; Y; Zr; SrMnO ; La; Mn; Sr; $\text{La}^*\text{Mn}^*\text{O}^*\text{Sr}$; La sy 4; sy 4; Mn sy 4; O sy 4; Sr sy 4; LaSrMnO ; La cp; D; O_2 ; O in 2; in 2; Ce; Tb; Tb^{4+} ; Tb ip 4; ip 4; Nb; Nb^{5+} ; Nb ip 5; ip 5; Ce^{4+} ; Ce ip 4; Ce^{3+} ; Ce ip 3; ip 3
- L72 ANSWER 27 OF 89 INSPEC (C) 2008 IET on STN
- AN 2000:6607546 INSPEC DN A2000-13-8630G-046; B2000-07-8410G-037 Full-text
- TI Pre-reforming of natural gas in solid oxide fuel-cell systems
- AU Peters, R.; Riensche, E.; Cremer, P. (Inst. for Mater. & Process. in Energy Syst., Forschungszentrum Jülich GmbH, Germany)
- SO Journal of Power Sources (March 2000), vol.86, no.1-2, p. 432-41, 9 refs. CODEN: JPSODZ, ISSN: 0378-7753
SICI: 0378-7753(200003)86:1/2L:432:RNSO;1-#
Price: 0378-7753/2000/\$20.00
Doc.No.: S0378-7753(99)00440-1
Published by: Elsevier, Switzerland
Conference: Sixth Grove Fuel Cell Symposium Fuel Cells - The Competitive Option for Sustainable Energy Supply, London, UK, 13-16 Sept. 1999
- DT Conference; Conference Article; Journal
- TC Experimental
- CY Switzerland
- LA English
- AB Several measures concerning fuel processing in a solid oxide fuel cell (SOFC) system offer the possibility of significant cost reduction and higher system efficiencies. For SOFC systems, the ratio between internal and pre-reforming

has to be optimized on the basis of experimental performance data. Furthermore, anode gas recycling by an injector in front of the pre-reformer can eliminate the steam generator and the corresponding heat of evaporation. A detailed study is carried out on pre-reforming in a reformer of considerable size (10 kW_{el}). Simulating anode gas recycling with an injector, the influence of carbon dioxide on reactor performance was studied. Also, the dependence of the methanol conversion on mass flow and temperature is discussed. In addition, some results concerning the dynamic behaviour of the pre-reformer are given

CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; B8410G Fuel cells

CT anodes; electrochemical electrodes; solid oxide fuel cells

ST solid oxide fuel-cell systems; natural gas pre-reforming; fuel processing; SOFC; cost reduction; higher system efficiencies; anode gas recycling; injector; reformer; carbon dioxide influence; reactor performance; methanol conversion; mass flow; temperature; dynamic behaviour; 10 kW

PHP power 1.0E+04 W

L72 ANSWER 28 OF 89 INSPEC (C) 2008 IET on STN

AN 2000:6783885 INSPEC DN A2001-02-8630G-077; B2001-01-8410G-137 Full-

text

TI Modelling of mass and heat transport in thick-substrate thin-electrolyte layer SOFCs

AU Ackmann, T.; De Haart, L.G.J.; Lehnert, W.; Thom, F. (Inst. for Mater. & Process. in Energy Syst., Forschungszentrum Jülich GmbH, Germany)

SO Fourth European Solid Oxide Fuel Cell Forum. Proceedings, vol.1, 2000, p. 431-8 vol.1 of 2 vol. 988 pp., 7 refs.

Editor(s): McEvoy, A.J.

ISBN: 3 905592 04 5

Published by: European Fuel Cell Forum, Oberrohrdorf, Switzerland

Conference: Fourth European Solid Oxide Fuel Cell Forum. Proceedings, Lucern, Switzerland, 10-14 July 2000

Sponsor(s): Swiss Federal Office of Energy; Swiss Assoc. Gas Ind.;

Swissair; Schweizerischer Nationalfonds

DT Conference; Conference Article

TC Theoretical

CY Switzerland

LA English

AB A nonisothermal simulation of diffusion and reforming reaction in the anode of a solid oxide fuel

cell (SOFC) is presented. The one-dimensional numerical simulation of anode, electrolyte and cathode uses mass and energy balance to determine the concentration and temperature profiles arising perpendicular to the fuel channel. The influence of material properties and operating conditions on the temperature profiles are shown and discussed

CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; A0260 Numerical approximation and analysis; B8410G Fuel cells; B0290Z Other numerical methods

CT anodes; cathodes; electrochemical electrodes; electrochemistry; electrolytes; heat transfer; mass transfer; numerical analysis; solid oxide fuel cells; thermal analysis

ST thick-substrate thin-electrolyte layer SOFCs; mass transport modelling; heat transport modelling; nonisothermal simulation; diffusion reaction; reforming reaction; anode; one-dimensional numerical simulation; electrolyte; cathode; temperature profile; concentration profile; fuel channel; material properties; operating conditions

ET Cs*F*O*G; SOFCs; S cp; cp; O cp; F cp; Cs cp

- L72 ANSWER 29 OF 89 INSPEC (C) 2008 IET on STN
AN 2000:6607545 INSPEC DN A2000-13-8630G-045; B2000-07-8410G-036 Full-text
- TI Evaluation and modeling of performance of anode-supported solid oxide fuel cell
- AU Yakabe, H.; Hishinuma, M.; Uratani, M.; Matsuzaki, Y.; Yasuda, I. (Fundamental Technol. Lab., Tokyo, Japan)
- SO Journal of Power Sources (March 2000), vol.86, no.1-2, p. 423-31, 9 refs. CODEN: JPSODZ, ISSN: 0378-7753
SICI: 0378-7753(200003)86:1/2L:423:EMPA;1-N
Price: 0378-7753/2000/\$20.00
Doc.No.: S0378-7753(99)00444-9
Published by: Elsevier, Switzerland
Conference: Sixth Grove Fuel Cell Symposium Fuel Cells - The Competitive Option for Sustainable Energy Supply, London, UK, 13-16 Sept. 1999
- DT Conference; Conference Article; Journal
- TC Theoretical
- CY Switzerland
- LA English
- AB For an anode-supported planar SOFC, a single-unit with double channels was modeled for a counter-flow pattern, and the concentration polarization at the anode was estimated. The flow phenomena were simulated using the finite volume method and the distribution of the gaseous species was calculated. In the model, it was assumed that the gas flow in the porous anode is governed by Darcy's Law, and the reactant species are transported to the electrolyte/anode interface mainly by diffusion in a multicomponent mixture system. For binary H₂-H₂O and CO-CO₂ systems, the calculated concentration polarization was found comparable to the experimental results. As an example for a multicomponent system, a model using steam-reformed methane as a fuel was employed to simulate the concentration polarization at a high fuel utilization. From the simulated results, it was evident that the shift reaction effectively reduces the concentration polarization when the fuel utilization is high
- CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; A4710 General fluid dynamics theory, simulation and other computational methods; A4755M Flow through porous media; A0260 Numerical approximation and analysis; B8410G Fuel cells; B0290T Finite element analysis
- CT anodes; electrolytes; finite volume methods; flow simulation; flow through porous media; solid oxide fuel cells
- ST anode-supported solid oxide fuel cell; planar SOFC; performance evaluation; performance modeling; counter-flow pattern; concentration polarization; flow phenomena simulation; finite volume method; gaseous species distribution; porous anode; Darcy's Law; reactant species; electrolyte/anode interface; multicomponent mixture system diffusion; H₂-H₂O system; CO-CO₂ system; steam-reformed methane; H₂-H₂O; CO-CO₂
- CHI H₂H₂O bin, H₂ bin, H bin, O bin; COCO₂ bin, CO bin, O₂ bin, C bin, O bin
- ET H*O; H₂O; H cp; cp; O cp; C*O; CO₂; C cp; H; O; CO; H₂-H₂O; CO-CO₂
- L72 ANSWER 30 OF 89 INSPEC (C) 2008 IET on STN
AN 2000:6783881 INSPEC DN A2001-02-8630G-073; B2001-01-8410G-135 Full-text
- TI Simulation and thermodynamic analysis of a tubular SOFC module
- AU Campanari, S. (Dept. of Energetics, Politecnico di Milano, Italy)
- SO Fourth European Solid Oxide Fuel Cell Forum. Proceedings, vol.1, 2000, p. 393-402 vol.1 of 2 vol. 988 pp., 10 refs.
Editor(s): McEvoy, A.J.
ISBN: 3 905592 04 5
Published by: European Fuel Cell Forum, Oberrohrdorf, Switzerland
Conference: Fourth European Solid Oxide Fuel Cell Forum. Proceedings, Lucern, Switzerland, 10-14 July 2000

Sponsor(s): Swiss Federal Office of Energy; Swiss Assoc. Gas Ind.;
Swissair; Schweizerischer Nationalfonds

DT Conference; Conference Article

TC Theoretical

CY Switzerland

LA English

AB Among the high temperature fuel cell technologies, tubular solid oxide fuel cells (

SOFC) stacks with internal reforming have emerged as a mature technology, with a serious potential for a future commercialization and extremely high performances predicted both with simple fuel cell plants and with integrated gas turbine-fuel cell systems. In this paper, a simulation of the operating conditions of a tubular SOFC stack, with natural gas feeding, internal reforming of hydrocarbons and internal air preheating is proposed. The model is calibrated on the available data for a recently demonstrated tubular SOFC prototype plant, and a first and second-law thermodynamic analysis of the stack performances is then carried out. The discussion is completed by a parametric analysis of the stack working conditions, as a function of the fuel utilization factor

CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; B8410G Fuel cells; B8255 Fuel cell power plants

CT anodes; cathodes; electrochemical electrodes; electrochemistry; fuel cell power plants; solid oxide fuel cells; thermal analysis; thermodynamics

ST tubular SOFC module; thermodynamic analysis; simulation; solid oxide fuel cell stacks; internal reforming; electrochemical performance; integrated gas turbine-fuel cell systems; fuel cell plants; operating conditions; natural gas feeding; internal air preheating; first-law thermodynamic analysis; second-law thermodynamic analysis; parametric analysis; stack working conditions; fuel utilization factor

L72 ANSWER 31 OF 89 INSPEC (C) 2008 IET on STN

AN 2000:6783878 INSPEC DN B2001-01-8410G-133 Full-text

TI Demonstration of CO2 capture from a solid oxide fuel cell

AU Haines, M.R.; Heidug, W.K.; (Shell Int. Exploration & Production B.V., Rijswijk, Netherlands), Li, K.J.

SO Fourth European Solid Oxide Fuel Cell Forum. Proceedings, vol.1, 2000, p. 365-74 vol.1 of 2 vol. 988 pp., 7 refs.

Editor(s): McEvoy, A.J.

ISBN: 3 905592 04 5

Published by: European Fuel Cell Forum, Oberrohrdorf, Switzerland
Conference: Fourth European Solid Oxide Fuel Cell Forum. Proceedings, Lucern, Switzerland, 10-14 July 2000

Sponsor(s): Swiss Federal Office of Energy; Swiss Assoc. Gas Ind.; Swissair; Schweizerischer Nationalfonds

DT Conference; Conference Article

TC Practical

CY Switzerland

LA English

AB A 250 kW tubular SOFC fuel cell adapted to recover CO2 will be demonstrated at a coastal site in Norway. The cell uses a solid state after-burning device to complete the oxidation of the fuel without introduction of air into the exhaust fuel stream. This is essential to prevent dilution of the exhaust gas with nitrogen, which would otherwise reduce the purity of the captured CO2. The project will also demonstrate effective sealing between anode and cathode gas streams which is another key requirement for effective CO2 capture from a fuel cell. Overall the project is intended to show that power can be generated from natural gas in industrial quantities with high efficiency whilst capturing all of the CO2 produced. In order to further demonstrate

- sustainability principles it is planned to provide power and heat to an adjacent fish farm project and to reuse the CO₂ as a nutrient for the algae upon which the fish will feed
- CC B8410G Fuel cells; B8255 Fuel cell power plants; B8230 Thermal power stations and plants; E3010 Agriculture
- CT anodes; aquaculture; carbon compounds; cathodes; cogeneration; electrochemical electrodes; fuel cell power plants; oxidation; solid oxide fuel cells
- ST CO₂ capture; solid oxide fuel cell; tubular SOFC fuel cell; coastal site; Norway; oxidation; solid state after-burning device; exhaust gas dilution prevention; anode gas stream sealing; cathode gas stream sealing; natural gas power generation; high efficiency; fish farm project; nutrient; algae; 250 kW; CO₂
- CHI CO₂ bin, O₂ bin, C bin, O bin
- PHP power 2.5E+05 W
- ET O; C*O; CO₂; C cp; cp; O cp
- L72 ANSWER 32 OF 89 INSPEC (C) 2008 IET on STN
- AN 2000:6783876 INSPEC DN A2001-02-8630G-070; B2001-01-8410G-131 [Full-text](#)
- TI Modelling of planar anode-supported thin-layer SOFC stacks
- AU Stolten, D.; Froning, D.; De Haart, L.G.J. (Inst. for Mater. & Process. in Energy Syst., Forschungszentrum Julich GmbH, Germany)
- SO Fourth European Solid Oxide Fuel Cell Forum. Proceedings, vol.1, 2000, p. 347-54 vol.1 of 2 vol. 988 pp., 17 refs.
Editor(s): McEvoy, A.J.
ISBN: 3 905592 04 5
Published by: European Fuel Cell Forum, Oberrohrdorf, Switzerland
Conference: Fourth European Solid Oxide Fuel Cell Forum. Proceedings, Lucern, Switzerland, 10-14 July 2000
Sponsor(s): Swiss Federal Office of Energy; Swiss Assoc. Gas Ind.; Swissair; Schweizerischer Nationalfonds
- DT Conference; Conference Article
- TC Theoretical
- CY Switzerland
- LA English
- AB In a solid oxide fuel cell stack the temperature distribution resulting from the current density distribution, the gas flow distribution and the heat transfer has to be homogeneous both within the cell plane as well as perpendicular to the cell plane. Large temperature gradients in either direction can cause damage to one or more of the components or interfaces due to thermal stresses. Numerous calculations were performed with variation of geometric and operation parameters in order to optimize the behaviour of planar anode supported thin film SOFC stacks
- CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; A4725Q Convection and heat transfer; B8410G Fuel cells
- CT anodes; current density; electrochemical electrodes; heat transfer; solid oxide fuel cells; temperature distribution; thermal stresses
- ST planar anode-supported thin-layer SOFC stacks; modelling; solid oxide fuel cell stack; temperature distribution; current density distribution; gas flow distribution; heat transfer; temperature gradients; thermal stresses
- L72 ANSWER 33 OF 89 INSPEC (C) 2008 IET on STN
- AN 2001:6902682 INSPEC DN A2001-10-8245-014; B2001-05-8410G-037 [Full-text](#)
- TI Electrocatalytic activity of a Gd₂Ti_{0.6}Mo_{1.2}Sc_{0.2}O_{7-δ} anode towards hydrogen and methane electro-oxidation in a solid oxide fuel cell

- AU Mailley, S.C.; Kelaidopoulou, A.; Siddle, A.; Dicks, A.L.; (Advantica Technol. Ltd., Loughborough, UK), Holtappels, P.; Hatchwell, C.E.; Mogensen, M.
- SO Ionics (2000), vol.6, no.5-6, p. 331-9, 18 refs.
CODEN: IONIFA, ISSN: 0947-7047
SICI: 0947-7047(2000)6:5<6L331:EAG6;1-C
Published by: Inst. Ionics, Germany
- DT Journal
- TC Experimental
- CY Germany
- LA English
- AB Mixed conducting oxide anodes are being considered for the direct utilisation of natural gas in high temperature fuel cells. This work refers to the electrochemical characterization of the pyrochlore $\text{Gd}_2\text{Ti}_{0.6}\text{Mo}_{1.2}\text{Sc}_{0.2}\text{O}_{7-\delta}$ (GTMS) as anode in a solid oxide fuel cell running in low humidity hydrogen or methane. The electro-oxidation reaction was investigated using impedance spectroscopy, potentiostatic measurements and cyclic voltammetry. Kinetic data were obtained for different fuels in the temperature range 845-932°C. In a methane-fuelled cell, steam reforming appears to be the rate-limiting step. The overall polarisation resistance of the anode under open circuit conditions at 932°C was $6.86 \Omega \cdot \text{cm}^2$ in 97% $\text{H}_2/3\% \text{H}_2\text{O}$, and $43 \Omega \cdot \text{cm}^2$ in 97% $\text{CH}_4/3\% \text{H}_2\text{O}$. For a 97% fuel-3% $\text{H}_2\text{O}/\text{GTMS}$ dbilvert.YSZ-Al₂O₃ dbilvert.Pt/air cell, the maximum power output at 932°C was 9.5 mW/cm² and 1.8 mW/cm² in hydrogen and methane, respectively. First investigations on this type of electrode material show unidentified peaks on XRD spectra after electrochemical test, which indicate GTMS instability under experimental conditions
- CC A8245 Electrochemistry and electrophoresis; A8630G Fuel cells; A8280F Electrochemical analytical methods; A8265J Heterogeneous catalysis at surfaces and other surface reactions; A8160 Corrosion, oxidation, etching, and other surface treatments; B8410G Fuel cells
- CT anodes; catalysis; electrochemical electrodes; gadolinium compounds; molybdenum compounds; oxidation; scandium compounds; solid oxide fuel cells; titanium compounds; voltammetry (chemical analysis); X-ray diffraction
- ST mixed conducting oxide anodes; electrocatalytic activity; electro-oxidation; solid oxide fuel; pyrochlore; impedance spectroscopy; potentiostatic measurements; cyclic voltammetry; methane-fuelled cell; steam reforming; rate-limiting step; polarisation resistance; open circuit conditions; power output; XRD; 845 to 932 degC; $\text{Gd}_2\text{Ti}_{0.6}\text{Mo}_{1.2}\text{Sc}_{0.2}\text{O}_7$
- CHI $\text{Gd}_2\text{Ti}_{0.6}\text{Mo}_{1.2}\text{Sc}_{0.2}\text{O}_7$ ss, $\text{Mo}_{1.2}$ ss, $\text{Sc}_{0.2}$ ss, $\text{Ti}_{0.6}$ ss, Gd ss, Mo ss, O_7 ss, Sc ss, Ti ss, O ss
- PHP temperature $1.12\text{E}+03$ to $1.21\text{E}+03$ K
- BT $\text{Mo}^*\text{O}^*\text{Sc}^*\text{Ti}$; Mo sy 4; sy 4; O sy 4; Sc sy 4; Ti sy 4; $\text{Ti}_{0.6}\text{Mo}_{1.2}\text{Sc}_{0.2}\text{O}_7$; Ti cp; cp; Mo cp; Sc cp; O cp; $\text{Ti}_{0.6}\text{Mo}_{1.2}\text{Sc}_{0.2}\text{O}_7$; Mo ; Sc ; Ti ; Gd ; O ; $\text{Gd}^*\text{Mo}^*\text{O}^*\text{Sc}^*\text{Ti}$; Gd sy 5; sy 5; Mo sy 5; O sy 5; Sc sy 5; Ti sy 5; $\text{Gd}_2\text{Ti}_{0.6}\text{Mo}_{1.2}\text{Sc}_{0.2}\text{O}_7$; Gd cp; C ; H_2 ; H^*O ; H_2O ; H cp; C^*H ; CH_4 ; C cp; Al^*O ; Al_2O_3 ; Al cp; Pt
- L72 ANSWER 34 OF 89 INSPEC (C) 2008 IET on STN
- AN 2000:6783874 INSPEC DN A2001-02-8630G-068; B2001-01-8410G-129 Full-text
- TI System identification of reaction mechanisms in SOFC electrodes by deconvolution of electrochemical impedance spectra
- AU Schichlein, H.; Muller, A.C.; Ivers-Tiffée, E. (Inst. für Werkstoffe der Elektrotech., Karlsruhe Univ., Germany)
- SO Fourth European Solid Oxide Fuel Cell Forum. Proceedings, vol.1, 2000, p. 325-34 vol.1 of 2 vol. 988 pp., 9 refs.
Editor(s): McEvoy, A.J.

ISBN: 3 905592 04 5

Published by: European Fuel Cell Forum, Oberrohrdorf, Switzerland
Conference: Fourth European Solid Oxide Fuel Cell Forum. Proceedings,
Lucern, Switzerland, 10-14 July 2000

Sponsor(s): Swiss Federal Office of Energy; Swiss Assoc. Gas Ind.;
Swissair; Schweizerischer Nationalfonds

DT Conference; Conference Article

TC Theoretical; Experimental

CY Switzerland

LA English

AB System identification, a modelling approach derived from control theory, is applied to the identification of reaction mechanisms in SOFC electrodes. The method is illustrated with a simple reaction model which includes the adsorption of molecular oxygen on the electrode surface and the incorporation of oxygen ions into the electrolyte. The kinetics of the relevant reaction steps are identified using a distribution function of time constants which is calculated directly from electrochemical impedance spectra by a newly implemented deconvolution method. In contrast to the ubiquitous nonlinear least squares curve fit of equivalent circuit models, no a priori circuit choice has to be made. Moreover, the distribution function is able to resolve several physical processes within one frequency decade, much more than could be revealed using equivalent circuit models. Physical processes correspond to peaks in the distribution function. Based on the reaction model, the influence of operating conditions on the peak parameters is simulated. Relationships between peak parameters and electrochemical rate constants of the reaction model are subsequently established providing a strong tool for the identification of reaction mechanisms and loss factors

CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; B8410G Fuel cells

CT anodes; cathodes; electrochemical electrodes; electrochemistry; electrolytes; identification; solid oxide fuel cells

ST SOFC electrodes; electrochemical impedance spectra deconvolution; reaction mechanisms; system identification; simple reaction model; molecular oxygen adsorption; electrode surface; oxygen ions; electrolyte; distribution function; physical processes; operating conditions; peak parameters; electrochemical rate constants; reaction model; loss factors

L72 ANSWER 35 OF 89 INSPEC (C) 2008 IET on STN

AN 2001:7068443 INSPEC DN A2001-22-8630G-020; B2001-11-8410G-022 Full-text

TI Porous thin-film anode materials for solid-oxide fuel cells

AU Morse, J.D.; Graff, R.T.; Hayes, J.P.; Jankowski, A.F. (Lawrence Livermore Nat. Lab., CA, USA)

SO New Materials for Batteries and Fuel Cells. Symposium (Materials Research Society Symposium Proceedings Vol.575), 2000, p. 321-4 of xiii+439 pp., 11 refs.

Editor(s): Doughty, D.H.; Nazur, L.F.; Arakawa, M.; Brack, H-P.; Naoi, K.
ISBN: 1 55899 482 3

Published by: Mater. Res. Soc., Warrendale, PA, USA

Conference: New Materials for Batteries and Fuel Cells. Symposium, San Francisco, CA, USA, 5-8 April 1999

DT Conference; Conference Article

TC Experimental

CY United States

LA English

AB Thin film, solid-oxide fuel cells

(TFSOFCs) synthesized from an electrolyte and conductive material are developed using photolithographic patterning and physical vapor deposition. The anode layer must enable combination of the reactive gases, be conductive

to pass the electric current, and provide mechanical support to the electrolyte and cathode layers. The microstructure and morphology desired for the anode layer should facilitate generation of maximum current density from the fuel cell. For these purposes, the parameters of the deposition process and post-deposition patterning are developed to optimize a continuous porosity across the anode layer. The anode microstructure is characterized using scanning electron microscopy and the power output generated through current-voltage measurement

- CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; A6855 Thin film growth, structure, and epitaxy; A8115 Methods of thin film deposition; B8410G Fuel cells; B0520 Thin film growth and epitaxy; B7310D Current measurement; B7310B Voltage measurement
- CT anodes; crystal microstructure; crystal morphology; current density; electric current measurement; electrochemical electrodes; photolithography; porous materials; scanning electron microscopy; solid oxide fuel cells; thin films; vapour deposited coatings; voltage measurement
- ST porous thin-film anode materials; solid-oxide fuel cells; conductive material; electrolyte; photolithographic patterning; physical vapor deposition; anode layer; reactive gases combination; electric current; mechanical support; microstructure; morphology; maximum current density; fuel cell; deposition process parameters; post-deposition patterning; continuous porosity optimisation; scanning electron microscopy; current-voltage measurement
- ET Cs*F*O*S*T; TFSOFCs; T cp; cp; F cp; S cp; O cp; Cs cp
- L72 ANSWER 36 OF 89 INSPEC (C) 2008 IET on STN
- AN 2000:6745801 INSPEC DN A2000-23-8245-008; B2000-12-8410G-022 [Full-text](#)
- TI Influence of the coexisting gases on the electrochemical reaction rates between 873 and 1173 K in a CH₄-H₂O/Pt/YSZ system
- AU Onuma, S.; (Inst. of Environ. Sci. & Technol., Yokohama Nat. Univ., Japan), Kaimai, A.; Kawamura, K.; Nigara, Y.; Kawada, T.; Mizusaki, J.; Tagawa, H.
- SO Solid State Ionics, Diffusion & Reactions (July 2000), vol.132, no.3-4, p. 309-31, 7 refs.
CODEN: SSIOD3, ISSN: 0167-2738
SICI: 0167-2738(200007)132:3/4L309:ICGE;1-I
Price: 0167-2738/2000/\$20.00
Doc.No.: S0167-2738(00)00647-0
Published by: Elsevier, Netherlands
- DT Journal
- TC Experimental
- CY Netherlands
- LA English
- AB The rates of electrochemical reactions were clarified in a CH₄-H₂O system at the interface of a porous Pt electrode/Y2O3-stabilized ZrO₂ (YSZ) electrolyte between 873 and 1173 K to elucidate the kinetics of the anode reaction of solid oxide fuel cells (SOFCs). The dominant electrochemical reaction was found to be the redox process of H₂/H₂O, where H₂, C, CO, and CO₂ were formed without a current by the chemical reactions in a CH₄-H₂O system. The partial electrochemical reaction rates of H₂, CO, C, and CH₄ were determined. The rate of the electrochemical reaction of CO/CO₂ in a CH₄-H₂O system is larger than that in a CO-CO₂ system under anodic polarization at 873 and 973 K. This means both the efficiency and the rate of the utilization of fuels on SOFCs are increased
- CC A8245 Electrochemistry and electrophoresis; A6845D Adsorption and desorption kinetics; evaporation and condensation; A8220P Measurements of chemical rate constants, reaction cross sections, and activation energies; A8230F Ion-molecule, ion-ion, and charge-transfer reactions; A8230H Chemical exchanges (substitution, atom transfer, abstraction,

- disproportionation, and group exchange); A8630G Fuel cells; A8265M Sorption and accommodation coefficients (surface chemistry); B8410G Fuel cells
- CT adsorption; anodes; charge exchange; chemical exchanges; electric potential; electrochemical electrodes; electrochemistry; organic compounds; oxidation; platinum; reaction rate constants; reduction (chemical); solid electrolytes; solid oxide fuel cells; surface chemistry; yttrium compounds; zirconium compounds
- ST (CH₄-H₂)-Pt-YSZ system; electrochemical reaction rates; temperature dependence; coexisting gases influence; porous Pt electrode; YSZ electrolyte; electrode-electrolyte interface; anode reaction kinetics; solid oxide fuel cells; H₂-H₂O redox process; H₂ formation; C formation; CO formation; CO₂ formation; current-free formation; partial electrochemical reaction rates; CO-CO₂ electrochemical reaction; anodic polarization; fuel utilization rate; SOFC efficiency; 873 to 1173 K; Pt-(ZrO₂Y₂O₃); H₂; C; CO; CO₂
- CHI Pt-ZrO₂Y₂O₃ int, ZrO₂Y₂O₃ int, O₂ int, O₃ int, Pt int, Y₂ int, Zr int, O int, Y int, ZrO₂Y₂O₃ ss, O₂ ss, O₃ ss, Y₂ ss, Zr ss, O ss, Y ss, Pt el; H₂ el, H el; C el; CO bin, C bin, O bin; CO₂ bin, O₂ bin, C bin, O bin
- PHP temperature 8.73E+02 to 1.173E+03 K
- ET H*O; H₂O; H cp; cp; O cp; Pt; C*O; CO₂; C cp; O*Y*Zr; O sy 3; sy 3; Y sy 3; Zr sy 3; ZrO₂Y₂O₃; Zr cp; Y cp; ZrO₂Y₂O; O; Y; Zr; C*H*O; CH₄; CH₄-H₂O; O*Y; Y₂O₃; O*Zr; ZrO₂; Cs*F*O*S; SOFCs; S cp; F cp; Cs cp; H₂; C; CO; C*H; CO-CO₂
- L72 ANSWER 37 OF 89 INSPEC (C) 2008 IET on STN
- AN 2000:6783869 INSPEC DN A2001-02-8630G-063; B2001-01-8410G-124 Full-text
- TI Impedance measurements for development and quality control of tubular solid oxide fuel cells
- AU Schichl, H.; Richter, F.; (Siemens AG, Erlangen, Germany), Schiller, C.A.
- SO Fourth European Solid Oxide Fuel Cell Forum. Proceedings, vol.1, 2000, p. 273-82 vol.1 of 2 vol. 988 pp., 4 refs.
Editor(s): McEvoy, A.J.
ISBN: 3 905592 04 5
Published by: European Fuel Cell Forum, Oberrohrdorf, Switzerland
Conference: Fourth European Solid Oxide Fuel Cell Forum. Proceedings, Lucern, Switzerland, 10-14 July 2000
Sponsor(s): Swiss Federal Office of Energy; Swiss Assoc. Gas Ind.; Swissair; Schweizerischer Nationalfonds
- DT Conference; Conference Article
- TC Experimental
- CY Switzerland
- LA English
- AB Siemens Westinghouse Power Corp. manufactures and supplies SOFC facilities. Installations with a power of 100 kW are currently in use, a pilot plant with a power of 1 MW will be delivered in 2002. The electrochemical cell is of a tubular geometry and consists of a cylindrical, porous tube with integrated cathode, an electrolyte layer and the anode at the outside. The length of a standard design cell is about 1.8 meters and the cell has a diameter of 22 millimeters. Due to the process of fabrication as well as to the very thin electrolyte layer (about 30 μm) the implementation of reference electrodes to separate single electrode potentials is not possible. But, the determination of the polarization resistances as well as the determination of the additional contributions is an unavoidable task for the quality control and the improvement of the fuel cell. The performance of impedance measurements of high precision in the frequency range from 1 mHz to 1 MHz was made possible in 1999. For this purpose short tube segments, cut from the original tubes, were mounted in houses of Al₂O₃ and sealed appropriately at the end

faces. The relaxation parameters obtained from impedance measurements of a working cell at 950°C can be assigned to different processes. First of all, the conductive pathways, which are of extraordinary form in the cylindrical cell design, are taken into account. Furthermore, these ohmic contributions can be separated from the activation polarization of the electrodes and from contributions due to gas diffusion

CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; B8410G Fuel cells; B7310J Impedance and admittance measurement; B0170L Inspection and quality control; E1610 Inspection and quality control; E1620 Measurement

CT anodes; cathodes; electric impedance measurement; electrochemical electrodes; electrochemistry; electrolytes; quality control; solid oxide fuel cells

ST tubular solid oxide fuel cells; impedance measurements; development; quality control; SOFC; pilot power plant; electrochemical cell; tubular geometry; cathode; electrolyte layer; anode; fabrication; polarization resistances; relaxation parameters; conductive pathways; ohmic contributions; activation polarization; gas diffusion; 100 kW; 1 MW; 22 mm; 30 mm; 1 mHz to 1 MHz; 950 °C; 1.8 m; Al2O3

CHI Al2O3 bin, Al2 bin, Al bin, O3 bin, O bin

PHP power 1.0E+05 W; power 1.0E+06 W; size 2.2E-02 m; size 3.0E-05 m; frequency 1.0E-03 to 1.0E+06 Hz; temperature 1.22E+03 K; size 1.8E+00 m

ET O; Al; Al*O; Al2O3; Al cp; cp; O cp; C

L72 ANSWER 38 OF 89 INSPEC (C) 2008 IET on STN

AN 2000:6783867 INSPEC DN A2001-02-8630G-061; B2001-01-8410G-122 Full-

text

TI Improved tubular SOFC for quick thermal cycling

AU Van Herle, J.; Sfeir, J.; Ihringer, R.; (Dept. of Chem., Fed. Inst. of Technol., Lausanne, Switzerland), Sammes, N.M.; Tompsett, G.; Kendall, K.; Yamada, K.; Wen, C.; Ihara, M.; Kawada, T.; Mizusaki, J.

SO Fourth European Solid Oxide Fuel Cell Forum. Proceedings, vol.1, 2000, p. 251-60 vol.1 of 2 vol. 988 pp., 13 refs.

Editor(s): McEvoy, A.J.

ISBN: 3 905592 04 5

Published by: European Fuel Cell Forum, Oberrohrdorf, Switzerland

Conference: Fourth European Solid Oxide Fuel Cell Forum. Proceedings, Lucern, Switzerland, 10-14 July 2000

Sponsor(s): Swiss Federal Office of Energy; Swiss Assoc. Gas Ind.;

Swissair; Schweizerischer Nationalfonds

DT Conference; Conference Article

TC Experimental

CY Switzerland

LA English

AB SOFCs are considered for light fuel cell vehicles. Robust microtubular ceramics, made by extrusion, withstand heating cycles of a few minutes, offsetting a slow start-up/cool-down drawback. A main requirement is to raise power density by fabricating more efficient electrodes. Results on electrode development and mechanical testing are presented here

CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; B8410G Fuel cells; B8520 Transportation

CT anodes; cathodes; electric vehicles; electrochemical electrodes; electrochemistry; mechanical testing; solid oxide fuel cells; thermal analysis

ST tubular SOFC; thermal cycling; light fuel cell vehicles; robust microtubular ceramics; extrusion; solid oxide fuel cells; power density; electrodes; fabrication; electrode development; mechanical testing

L72 ANSWER 39 OF 89 INSPEC (C) 2008 IET on STN

AN 2000:6783863 INSPEC DN A2001-02-8630G-057; B2001-01-8410G-118 Full-

text

- TI Development of SOFC and SOFC bundle
- AU Chukharev, V.F.; Bochkov, B.M.; Zakutnev, A.D.; Kulaev, V.V.
(RFNC-VNIITF, Snezhinsk, Russia)
- SO Fourth European Solid Oxide Fuel Cell Forum. Proceedings, vol.1, 2000, p. 211-19 vol.1 of 2 vol. 988 pp., 1 refs.
Editor(s): McEvoy, A.J.
ISBN: 3 905592 04 5
Published by: European Fuel Cell Forum, Oberrohrdorf, Switzerland
Conference: Fourth European Solid Oxide Fuel Cell Forum. Proceedings, Lucern, Switzerland, 10-14 July 2000
Sponsor(s): Swiss Federal Office of Energy; Swiss Assoc. Gas Ind.; Swissair; Schweizerischer Nationalfonds
- DT Conference; Conference Article
- TC Experimental
- CY Switzerland
- LA English
- AB The concept of a tubular SOFC, SOFC connection in the bundle and joining the bundles in the stack of preset output power are discussed in this presentation. Following results of electrical and electrochemical properties studies have been presented both for single SOFC, SOFC bundles and SOFC stack: for single SOFC Psp.max=250 mW/cm², Jsp.max=500 mA/cm² for SOFC bundle Psp.max=160 mW/cm², jsp.max=320 mA/cm². Results of long-term SOFC and SOFC bundle testing have been presented as well. Results of efforts aimed at enhancement of SOFC efficiency due to improvement of YSZ structure are also presented. Application of nano-scale powder as initial material for solid YSZ electrolyte production allows increase of power density to 550 mW/cm² at jsp.max=1050 mA/cm²
- CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; B8410G Fuel cells
- CT anodes; cathodes; electrochemical electrodes; electrochemistry; electrolytes; solid oxide fuel cells; yttrium compounds; zirconium compounds
- ST solid oxide fuel cells; SOFC bundle; electrochemical properties; electrical properties; bundle testing; nano-scale powder; solid YSZ electrolyte; power density; ZrO₂-Y₂O₃
- CHI ZrO₂-Y₂O₃ int, Y₂O₃ int, ZrO₂ int, O₂ int, O₃ int, Y₂ int, Zr int, O int, Y int, Y₂O₃ bin, ZrO₂ bin, O₂ bin, O₃ bin, Y₂ bin, Zr bin, O bin, Y bin
- ET O*Y; Y₂O₃; Y cp; cp; O cp; O₂-Y₂O₃; O; Y₂O; O*Zr; ZrO; Zr cp; Y; Zr
- L72 ANSWER 40 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN DUPLICATE 1
- AN 2000:589325 HCAPLUS Full-text
- DN 133:283983
- ED Entered STN: 24 Aug 2000
- TI Thin SOFC electrolytes and their interfaces- A near-term research strategy
- AU McEvoy, A. J.
- CS Ecole Polytechnique Federale de Lausanne, Laboratory for Photonics and Interfaces, Lausanne, CH-1015, Switz.
- SO Solid State Ionics (2000), 132(3,4), 159-165
CODEN: SSIOD3; ISSN: 0167-2738
- PB Elsevier Science B.V.
- DT Journal; General Review
- LA English
- CC 52-0 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 57, 72, 76
- AB A review with 29 refs. In the apparent impasse concerning the identification of more promising new materials for intermediate temperature solid oxide fuel cells, and the

imperative for the credibility of the technol. that applications be proven in the short term, all relevant information from earlier work should be exploited to secure the stable and efficient operation of SOFC systems with the conventional established materials, stabilized zirconia, perovskite cathodes and cermet anodes. In a retrospective, seminal work of the past is revisited and guidelines for ongoing work established on that basis.

ST review solid oxide fuel cell electrolyte

IT Fuel cell electrolytes (thin SOFC electrolytes and their interfaces; a near-term research strategy)

RE.CNT 30 THERE ARE 30 CITED REFERENCES AVAILABLE FOR THIS RECORD RE

- (1) Anon; German Research and Technology Ministry 1977, BMFT-FBT 77-17
- (2) Baur, E; Z Elektrochem 1937, V43, P727 HCAPLUS
- (3) Bergmann, E; Swiss patent application 3903/78 1978
- (4) Brown, J; Energy 1986, V11, P209 HCAPLUS
- (5) Button, D; American Ceramics Society Meeting 1996
- (6) Dmowski, W; Physica B 1998, V248, P95 HCAPLUS
- (7) Godickemeier, M; Thesis 1996
- (8) Horita, T; J Electrochem Soc 1998, V145, P3196 HCAPLUS
- (9) Ihringer, R; Proc 3rd Eur SOFC Forum 1998, P407
- (10) Jiang, S; Solid State Ionics 1999, V121, P1 HCAPLUS
- (11) Kawasaki, S; US 5527633 1996 HCAPLUS
- (12) Kuo, J; J Solid State Chem 1989, V83, P52 HCAPLUS
- (13) Leach, C; J Mater Sci 1992, V27, P3812 HCAPLUS
- (14) McEvoy, A; Electrochem Soc Proc 1997, V97-24, P588
- (15) Mitsuyasu, H; Solid State Ionics 1998, V113-115, P279 HCAPLUS
- (16) Mobius, H; J Solid State Electrochem 1997, V1, P2 HCAPLUS
- (17) Mori, H; 8th Symposium of SOFC Society of Japan 1999, P49
- (18) Nernst, W; US 685730 1902 HCAPLUS
- (19) Ostwald, W; Z Elektrotech Elektrochem 1894, V4, P122
- (20) Perry, M; Nature 1999, V400, P649
- (21) Spacil, H; US 3503809 1970
- (22) Steele, B; Solid State Ionics 1995, V75, P175
- (23) Svensson, A; J Electrochem Soc 1998, V145, P3130 HCAPLUS
- (24) Takahashi, T; Denki Kagaku 1970, V38, P288
- (25) Tannenberger, H; CH 5994292 1977
- (26) Tannenberger, H; Swiss patent application 15356/74 1974
- (27) Thampi, K; J Electrochem Soc 1995, V142, P506
- (28) Weber, A; Proc 17th Risoe Int Symp Mater Sci 1996, P473 HCAPLUS
- (29) Yokokawa, H; Science and Technology of Zirconia 1993, V5, P59
- (30) Yokokawa, H; Solid State Ionics 1990, V40-41, P398 HCAPLUS

L72 ANSWER 41 OF 89 INSPEC (C) 2008 IET on STN
AN 2000:6783850 INSPEC DN A2001-02-8630G-048; B2001-01-8410G-111 Full-text

TI Diesel-fueled solid oxide fuel cell auxiliary power units for heavy-duty vehicles
AU Dobbs, H.H.; (US Army TACOM, Warren, MI, USA), Krause, T.; Kumar, R.; Krumpelt, M.
SO Fourth European Solid Oxide Fuel Cell Forum. Proceedings, vol.1, 2000, p. 85-94 vol.1 of 2 vol. 988 pp., 7 refs.
Editor(s): McEvoy, A.J.
ISBN: 3 905592 04 5
Published by: European Fuel Cell Forum, Oberrohrdorf, Switzerland
Conference: Fourth European Solid Oxide Fuel Cell Forum. Proceedings, Lucerne, Switzerland, 10-14 July 2000
Sponsor(s): Swiss Federal Office of Energy; Swiss Assoc. Gas Ind.; Swissair; Schweizerischer Nationalfonds

- DT Conference; Conference Article
TC Application; Practical
CY Switzerland
LA English
AB This paper explores the potential of solid oxide fuel cells (SOFCs) as 3-10 kW auxiliary power units for trucks and military vehicles operating on diesel fuel. It discusses the requirements and specifications for such units, and the advantages, challenges and development issues for SOFCs used in this application. Based on system design and analysis, such systems should achieve efficiencies approaching 40% (based on the fuel's lower heating value), with a relatively simple system configuration. The major components of such a system are the fuel cell stack, a catalytic autothermal reformer, and a spent gas burner/air preheater. Building an SOFC-based auxiliary power unit is not straightforward, however, and the tasks needed to develop a 3-10 kW brassboard demonstration unit are outlined
- CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; B8410G Fuel cells; B8360 Power converters and power supplies to apparatus; B8210 Energy resources; B8520 Transportation
CT anodes; cathodes; electrochemical electrodes; electrochemistry; fuel; power supplies to apparatus; solid oxide fuel cells; vehicles
ST solid oxide fuel cells; auxiliary power units; trucks; military vehicles; diesel fuel; requirements; specifications; fuel cell stack; catalytic autothermal reformer; spent gas burner/air preheater; brassboard demonstration unit; 3 to 10 kW; 40 percent
PHP power 3.0E+03 to 1.0E+04 W; efficiency 4.0E+01 percent
ET Cs*F*O*S; SOFCs; S cp; cp; O cp; F cp; Cs cp
- L72 ANSWER 42 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN DUPLICATE 2
AN 2000:218976 HCAPLUS [Full-text](#)
DN 132:267479
ED Entered STN: 05 Apr 2000
TI Modelling of gas transport phenomena in SOFC anodes
AU Lehnert, W.; Meusinger, J.; Thom, F.
CS Forschungszentrum Julich, Institute of Energy Process Engineering, Julich, 52425, Germany
SO Journal of Power Sources (2000), 87(1-2), 57-63
CODEN: JPSODZ; ISSN: 0378-7753
PB Elsevier Science S.A.
DT Journal
LA English
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72
AB Internal steam reforming in SOFC cells leads to inhomogeneous temperature distributions according to the fast reforming reaction kinetics. This results in thermal induced stresses and may lead therefor to mech. failure of the material. A one-dimensional numerical simulation program has been developed to describe the transport of gases inside the SOFC anode due to diffusion and permeation as well as the kinetic of the reforming reaction and the electrochem. Simulations with exptl. determined reaction rates and structural properties of the anode materials have been performed. In order to reduce the methane conversion rate, a sensitivity anal. has been performed. It can be shown, e.g., that a reduction of the structural parameter ψ which is the ratio of porosity $\cdot \text{vepsiln.}$ to tortuosity δ of 26.28% compared to standard material leads to a lowering of the methane conversion rate of 12.24%. Finally, produced cermetts are screened in view of a conversion lowering effect.
- ST modeling gas transport anode; solid oxide fuel cell anode; methane steam reforming anode diffusion

IT Diffusion
 Fuel cell anodes
 Permeation
 Simulation and Modeling, physicochemical
 Solid state fuel cells
 Water gas shift reaction kinetics
 (modeling of gas transport phenomena in solid oxide
 fuel cell anodes)

IT Fuel gas manufacturing
 (steam reforming; modeling of gas transport phenomena in solid
 oxide fuel cell anodes)

IT 114168-16-0, Tz8y
 RL: DEV (Device component use); USES (Uses)
 (modeling of gas transport phenomena in solid oxide
 fuel cell anodes)

IT 74-82-8, Methane, uses
 RL: NUU (Other use, unclassified); USES (Uses)
 (modeling of gas transport phenomena in solid oxide
 fuel cell anodes)

RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD
 RE

- (1) Achenbach, E; J Power Sources 1994, V52, P283 HCAPLUS
- (2) Arnost, D; Chem Eng J 1995, V57, P91 HCAPLUS
- (3) Divisek, J; 10th SOFC Workshop 1997, V1
- (4) Drescher, W; Electrochim acta 1998, V43, P3059
- (5) Meusinger, J; J Power Sources 1998, V71, P315 HCAPLUS

L72 ANSWER 43 OF 89 INSPEC (C) 2008 IET on STN

AN 2000:6783841 INSPEC DN A2001-02-8630G-039; B2001-01-8410G-103 Full-
text

TI Status of anode supported-thin electrolyte ceramic SOFC
 component development at ECN
 AU Christie, G.M.; Nannensma, P.; Huijsmans, J.P.P. (Netherlands Energy Res.
 Found., Petten, Netherlands)
 SO Fourth European Solid Oxide Fuel Cell Forum. Proceedings, vol.1, 2000, p.
 3-11 vol.1 of 2 vol. 988 pp., 11 refs.

Editor(s): McEvoy, A.J.

ISBN: 3 905592 04 5

Published by: European Fuel Cell Forum, Oberrohrdorf, Switzerland
 Conference: Fourth European Solid Oxide Fuel Cell Forum. Proceedings,
 Lucern, Switzerland, 10-14 July 2000

Sponsor(s): Swiss Federal Office of Energy; Swiss Assoc. Gas Ind.;

Swissair; Schweizerischer Nationalfonds

DT Conference; Conference Article

TC Practical

CY Switzerland

LA English

AB ECN has carried out a focussed SOFC R&D effort to develop manufacturing
 protocols for 2nd generation, anode supported, thin electrolyte SOFC ceramic
 cell components using tape-casting and screen-printing fabrication
 techniques. This paper summarises the manufacturing procedure and the
 performance of state-of-the art components. The short-term component
 optimisation R&D program that focuses on cost reduction, performance
 improvement and reduction of bending is outlined. Finally the long-term
 fundamental SOFC R&D program at ECN is discussed

CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; B8410G
 Fuel cells; B0540 Ceramics and refractories (engineering materials
 science); B0170G General fabrication techniques; E1710 Engineering
 materials

CT anodes; ceramics; electrochemical electrodes; manufacture;

solid electrolytes; solid oxide fuel cells

ST anode supported-thin electrolyte ceramic SOFC component; R&D effort; manufacturing protocols; thin electrolyte SOFC ceramic cell components; tape-casting; screen-printing fabrication; manufacturing procedure; state-of-the-art components performance; short-term component optimisation R&D program; cost reduction; performance improvement; bending reduction

ET D

L72 ANSWER 44 OF 89 INSPEC (C) 2008 IET on STN

AN 2000:6783840 INSPEC DN A2001-02-0130C-012; B2001-01-0100-037 Full-text

TI Fourth European Solid Oxide Fuel Cell Forum. Proceedings

AU Editor(s): McEvoy, A.J.

SO vol.1, 2000, 2 vol. 988 pp.
ISBN: 3 905592 04 5
Published by: European Fuel Cell Forum, Oberrohrdorf, Switzerland
Conference: Fourth European Solid Oxide Fuel Cell Forum. Proceedings, Lucern, Switzerland, 10-14 July 2000
Sponsor(s): Swiss Federal Office of Energy; Swiss Assoc. Gas Ind.; Swissair; Schweizerischer Nationalfonds

DT Conference Proceeding

CY Switzerland

LA English

AB The following topics were dealt with: solid oxide fuel cells; fuels; fuel chemistry; SOFC systems; SOFC diagnostics; SOFC modelling; anode materials; cathode materials; electrolytes; oxygen transport materials; interconnect materials; stack structure materials; fuel cell infrastructure; and standards and manufacturing

CC A0130C Conference proceedings; A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; A6630H Self-diffusion and ionic conduction in solid nonmetals; B0100 General electrical engineering topics; B8410G Fuel cells; B8255 Fuel cell power plants

CT anodes; cathodes; electrochemical electrodes; fuel cell power plants; solid electrolytes; solid oxide fuel cells

ST solid oxide fuel cells; fuels; fuel chemistry; SOFC systems; SOFC diagnostics; SOFC modelling; anode materials; cathode materials; electrolytes; oxygen transport materials; interconnect materials; stack structure materials; fuel cell infrastructure; standards; manufacturing; fuel cell power plants

L72 ANSWER 45 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1999:796087 HCAPLUS Full-text

DN 132:13910

ED Entered STN: 17 Dec 1999

TI Ceramic honeycomb fuel cell

IN Lawless, William Nicholas

PA Ceramphysics, Inc., USA

SO PCT Int. Appl., 25 pp.
CODEN: PIXXD2

DT Patent

LA English

IC ICM H01M008-12

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 57

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9965099	A2	19991216	WO 1999-US13132	19990610 <--

WO 9965099 A3 20000413
 W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ,
 DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS,
 JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK,
 MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ,
 TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW
 RW: GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW, AT, BE, CH, CY, DE, DK,
 ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG,
 CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG
 CA 2342154 A1 19991216 CA 1999-2342154 19990610 <--
 AU 9950823 A 19991230 AU 1999-50823 19990610 <--
 EP 1095418 A2 20010502 EP 1999-935317 19990610 <--
 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,
 IE, FI
 BR 9911169 A 20011016 BR 1999-11169 19990610 <--
 US 6372375 B1 20020416 US 1999-329413 19990610 <--
 JP 2002518794 T 20020625 JP 2000-554013 19990610 <--
 RU 2221315 C2 20040110 RU 2001-101170 19990610 <--
 MX 2000PA12324 A 20041203 MX 2000-PA12324 20001211 <--
 PRAI US 1998-89169P P 19980612 <--
 WO 1999-US13132 W 19990610 <--

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 9965099	ICM	H01M008-12
	IPCI	H01M0008-12 [ICM,6]
	IPCR	H01M0004-86 [I,C*]; H01M0004-86 [I,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-04 [I,C*]; H01M0008-04 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]; H01M0008-24 [I,C*]; H01M0008-24 [I,A]
	ECLA	H01M008/12B2B2; H01M008/12B2B4; H01M008/12B2C2; H01M008/12E2D; H01M008/24B2H4; H01M008/24D4
CA 2342154	IPCI	H01M0008-12 [ICM,6]
	IPCR	H01M0004-86 [I,C*]; H01M0004-86 [I,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-04 [I,C*]; H01M0008-04 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]
AU 9950823	IPCI	H01M0008-12 [ICM,6]
	IPCR	H01M0004-86 [I,C*]; H01M0004-86 [I,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-04 [I,C*]; H01M0008-04 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]
EP 1095418	IPCI	H01M0008-12 [ICM,6]
	IPCR	H01M0004-86 [I,C*]; H01M0004-86 [I,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-04 [I,C*]; H01M0008-04 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]
BR 9911169	IPCI	H01M0008-12 [ICM,7]
	IPCR	H01M0004-86 [I,C*]; H01M0004-86 [I,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-04 [I,C*]; H01M0008-04 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]; H01M0008-24 [I,C*]; H01M0008-24 [I,A]
US 6372375	IPCI	H01M0008-12 [ICM,7]; H01M0008-10 [ICS,7]; H01M0004-86 [ICS,7]
	IPCR	H01M0004-86 [I,C*]; H01M0004-86 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]; H01M0008-24 [I,C*]; H01M0008-24 [I,A]
	NCL	429/040.000; 429/033.000; 429/034.000; 429/035.000; 429/041.000
	ECLA	H01M004/86B6; H01M008/12B2B4; H01M008/12B2C2;

H01M0008/12E2D; H01M0008/24B2H4; H01M0008/24D4
 JP 2002518794 IPCI H01M0008-02 [ICM,7]; H01M0008-02 [ICS,7]; H01M0004-86
 [ICS,7]; H01M0008-12 [ICS,7]
 IPCR H01M0004-86 [I,C*]; H01M0004-86 [I,A]; H01M0008-02
 [I,C*]; H01M0008-02 [I,A]; H01M0008-04 [I,C*];
 H01M0008-04 [I,A]; H01M0008-12 [I,C*]; H01M0008-12
 [I,A]; H01M0008-24 [I,C*]; H01M0008-24 [I,A]
 RU 2221315 IPCI H01M0008-12 [ICM,7]; H01M0008-04 [ICS,7]
 IPCR H01M0004-86 [I,C*]; H01M0004-86 [I,A]; H01M0008-02
 [I,C*]; H01M0008-02 [I,A]; H01M0008-04 [I,C*];
 H01M0008-04 [I,A]; H01M0008-12 [I,C*]; H01M0008-12
 [I,A]; H01M0008-24 [I,C*]; H01M0008-24 [I,A]
 ECLA H01M0008/12B2B2; H01M0008/12B2B4; H01M0008/12B2C2;
 H01M0008/12E2D; H01M0008/24B2H4; H01M0008/24D4; T01M; T01M
 MX 2000PA12324 IPCI H01M0008-12 [ICM,6]
 AB A honeycomb ceramic fuel cell is provided including, among other things, (i)
 an yttria stabilized bismuth oxide oxygen ion conductive ceramic with zirconia
 incorporated therein, (ii) a niobia stabilized bismuth oxide oxygen ion
 conductive ceramic, (iii) a copper cermet anode electrode disposed in the fuel
 supply passage of a bismuth oxide ceramic fuel cell, or (iv) specially
 arranged inter-passage channels formed in the ceramic body of the fuel cell.
 In accordance with one embodiment of the present invention, a ceramic fuel
 cell is provided comprising an oxidant supply passage, a cathode electrode
 disposed in the oxidant supply passage, a fuel supply passage, an anode
 electrode disposed in the fuel supply passage, and a stabilized bismuth oxide
 oxygen ion conductive ceramic interposed between the cathode electrode and the
 anode electrode. The ceramic may be stabilized with yttria or niobia and may
 include zirconia. Fuel cells incorporating the ceramic compns. of the present
 invention are operational at temps. at or below about 650°. Thus, sooting of
 the ceramic body is not a problem if unreformed organic fuels are utilized in
 the present invention. According to certain embodiments of the present
 invention, a zirconia coating is interposed between the stabilized ceramic
 body and the anode electrode. Further, the ceramic electrodes (e.g. made of
 LXM whose L is La, M is MnO3, X is Pb, Sr, Ca or Ba) of the present invention
 may be provided with a silver overlay. The anode may also comprise a copper
 cermet.
 ST ceramic fuel cell
 IT Ceramics
 Fuel cell anodes
 Fuel cell cathodes
 Fuel cell electrolytes
 Fuel cells
 (ceramic honeycomb fuel cell)
 IT Glass, uses
 RL: DEV (Device component use); MOA (Modifier or additive use); USES
 (Uses)
 (ceramic honeycomb fuel cell)
 IT 1313-96-8, Niobia
 RL: DEV (Device component use); USES (Uses)
 (bismuth oxide stabilized with; ceramic honeycomb fuel
 cell)
 IT 1314-36-9, Yttria, uses
 RL: DEV (Device component use); MOA (Modifier or additive use); USES
 (Uses)
 (bismuth oxide stabilized with; ceramic honeycomb fuel
 cell)
 IT 37296-86-9, Lanthanum lead manganese oxide 59707-46-9, Lanthanum
 manganese strontium oxide 116900-31-3, Bismuth copper oxide
 122466-80-2, Bismuth yttrium zirconium oxide 123273-09-6, Calcium
 lanthanum manganese oxide 142165-03-5, Bismuth niobium oxide

147551-34-6, Barium lanthanum manganese oxide

RL: DEV (Device component use); USES (Uses)

(ceramic honeycomb fuel cell)

IT 7440-22-4, Silver, uses

RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)

(layer; ceramic honeycomb fuel cell)

IT 1314-23-4, Zirconia, uses

RL: DEV (Device component use); USES (Uses)

(yttria-stabilized; ceramic honeycomb fuel cell)

IT 1304-76-3, Bismuth oxide, uses

RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)

(yttria-stabilized; ceramic honeycomb fuel cell)

L72 ANSWER 46 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1999:70393 HCAPLUS Full-text

DN 130:112677

ED Entered STN: 02 Feb 1999

TI Battery with porous spray-formed separator

IN Bogner, Richard S.

PA Hughes Electronics Corporation, USA

SO Eur. Pat. Appl., 10 pp.

CODEN: EPXXDW

DT Patent

LA English

IC ICM H01M0002-16

ICS H01M010-34

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 57

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 892449	A1	19990120	EP 1998-303898	19980518 <--
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
CA 2237457	A1	19981119	CA 1998-2237457	19980512 <--
PRAI US 1997-858301	A	19970519	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 892449	ICM	H01M0002-16
	ICS	H01M010-34
	IPCI	H01M0002-16 [ICM,6]; H01M0010-34 [ICS,6]
	IPCR	H01M0002-16 [I,C*]; H01M0002-16 [I,A]; H01M0010-24 [N,C*]; H01M0010-30 [N,A]; H01M0010-34 [I,C*]; H01M0010-34 [I,A]
CA 2237457	ECLA	H01M0002/16E; H01M010/34; H01M010/34D
	IPCI	H01M0002-14 [ICM,6]; H01M0010-02 [ICS,6]
	IPCR	H01M0002-16 [I,C*]; H01M0002-16 [I,A]; H01M0010-24 [N,C*]; H01M0010-30 [N,A]; H01M0010-34 [I,C*]; H01M0010-34 [I,A]

AB In a battery having ≥ 1 plate set, each plate set including an anode, a cathode, and a separator between the anode and the cathode, the separator is formed by spraying a porous layer of a ceramic separator material, such as ZrO_2 on the anode and/or the cathode. Spraying of the porous ceramic separator layer is preferably accomplished by plasma spraying. The porous separator layer is then saturated with an electrolyte. For most practical

applications, a number of the plate sets are placed into a sealed housing with external leads.

ST battery spray formed ceramic separator; zirconia spray formed

separator battery

IT Secondary batteries

(with porous spray-formed ceramic separator)

IT B314-23-4, Zirconium oxide (ZrO₂), uses

RL: TEM (Technical or engineered material use); USES (Uses)

(battery with porous spray-formed ceramic separator)

RE.CNT 10 THERE ARE 10 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Armstrong, B; Fuel Cell 1996 Fuel Cell Seminar Program and Abstracts, Proceedings of Fuel Cell Seminar, Orlando 1996, P127

(2) Armstrong, B; Manufacturing of planar ceramic interconnects

(3) Berger, C; US 3489610 A 1970 HCAPLUS

(4) Gage, B; US 5695888 A 1997 HCAPLUS

(5) Goebel, F; US 4283469 A 1981 HCAPLUS

(6) Hall, J; US 5395708 A 1995

(7) Lim, H; US 4567119 A 1986 HCAPLUS

(8) Lim, H; US 5368614 A 1994 HCAPLUS

(9) Sony Corp; JP 09007637 A 1997 HCAPLUS

(10) Wisconsin Alumni Res Found; EP 0523840 A 1993 HCAPLUS

L72 ANSWER 47 OF 89 INSPEC (C) 2008 IET on STN

AN 2001:6991059 INSPEC DN A2001-17-8630G-042; B2001-09-8410G-041 Full-

text

TI Production of synthesis gas using SOFC technology

AU van Berkel, F.P.F.; Schipper, L.S.; Christie, G.M. (Netherlands Energy Res. Found., Petten, Netherlands)

SO Solid Oxide Fuel Cells (SOFC VI). Proceedings of the Sixth International Symposium, 1999, p. 1177-84 of xviii+1200 pp., 9 refs.

Editor(s): Singhal, S.C.; Dokiya, M.

ISBN: 1 56677 242 7

Published by: Electrochem. Soc, Pennington, NJ, USA

Conference: Proceedings of Solid Oxide Fuel Cells, Honolulu, HI, USA, 17-22 Oct. 1999

DT Conference; Conference Article

TC Practical; Experimental

CY United States

LA English

AB During the last decade, several papers have been published concerning the use of the SOFC as a reactor for the cogeneration of chemicals as well as heat and power. One of the interesting applications of the SOFC technology is the partial oxidation of hydrocarbons, like the conversion of methane to syngas. This paper demonstrates the possibility to use SOFC technology for the partial oxidation of methane to syngas, resulting in a conversion of 85-95% and selectivity to syngas of 97-98% at an operating temperature of 850°C. Stable performance under syngas producing conditions has been shown over an operating period of 1200 hours

CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; B8410G

Fuel cells; B8255 Fuel cell power plants

CT anodes; cogeneration; electrochemical electrodes;

electrochemistry; fuel cell power plants; oxidation; solid oxide fuel cells

ST synthesis gas production; SOFC technology; cogeneration; hydrocarbon

partial oxidation; operating temperature; electrochemical performance;

syngas producing conditions; solid oxide fuel cells; 1200 h; 850 C; 85 to 95 percent; 97 to 98 percent

PHP time 4.3E+06 s; temperature 1.12E+03 K; efficiency 8.5E+01 to 9.5E+01

percent; efficiency 9.7E+01 to 9.8E+01 percent
 ET C

L72 ANSWER 48 OF 89 INSPEC (C) 2008 IET on STN
 AN 2001:6991041 INSPEC DN A2001-17-8630G-025; B2001-09-8410G-025 Full-text
 TI Reaction kinetics of CH₄-H₂O gas-mixtures on Pt/YSZ system [SOFC anodes]
 AU Onuma, S.; Mizusaki, J.; Kaimai, A.; Kawamura, K.; Nigara, Y.; Kawada, T.; Tagawa, H. (Res. Inst. for Sci. Meas., Tohoku Univ., Sendai, Japan)
 SO Solid Oxide Fuel Cells (SOFC VI). Proceedings of the Sixth International Symposium, 1999, p. 991-1000 of xviii+1200 pp., 5 refs.
 Editor(s): Singhal, S.C.; Dokiya, M.
 ISBN: 1 56677 242 7
 Published by: Electrochem. Soc, Pennington, NJ, USA
 Conference: Proceedings of Solid Oxide Fuel Cells, Honolulu, HI, USA, 17-22 Oct. 1999
 DT Conference; Conference Article
 TC Practical; Experimental
 CY United States
 LA English
 AB As a fundamental research on the internal reforming type SOFC anode reaction, a study was made on the reaction kinetics of the CH₄-H₂O gas-mixtures at the interface of a porous Pt electrode/Y₂O₃- stabilized ZrO₂ (YSZ) electrolyte at 873-1173 K. The rate of electrochemical oxidation of CH₄ and that of the reforming products, H₂, CO, and C, were determined as a function of the electrode potential and temperature. It was found that the dominant electrochemical reaction is the oxidation of H₂. The rate of the electrochemical oxidation of CO in a CH₄-H₂O system was found larger than that in a CO-CO₂-inert gas system at temperatures below 1073 K. It was suggested that the electrochemical CO oxidation rate is enhanced by the co-existing H₂-H₂O
 CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; A8240 Chemical kinetics and reactions: special regimes; B8410G Fuel cells
 CT Anodes; electrochemical electrodes; electrochemistry; oxidation; platinum; reaction kinetics; solid oxide fuel cells; yttrium compounds; zirconium compounds
 ST Pt-YSZ SOFC anode system; CH₄-H₂O gas-mixture reaction kinetics; internal reforming type SOFC anode reaction; YSZ electrolyte; electrochemical oxidation rate; reforming products; electrode potential; electrode temperature; dominant electrochemical reaction; 873 to 1173 K; Pt-ZrO₂-Y₂O₃
 CHI Pt-ZrO₂-Y₂O₃ int, Y₂O₃ int, ZrO₂ int, O₂ int, O₃ int, Pt int, Y₂ int, Zr int, O int, Y int, Y₂O₃ bin, ZrO₂ bin, O₂ bin, O₃ bin, Y₂ bin, Zr bin, O bin, Y bin, Pt el
 PHP temperature 8.73E+02 to 1.173E+03 K
 ET H⁺O; H₂O; H cp; cp; O cp; O*Y*Zr; O sy 3; sy 3; Y sy 3; Zr sy 3; ZrO₂; Zr cp; Y₂O₃; Y cp; ZrO₂-Y₂O₃; O*Zr; ZrO; O*Y; Y₂O; O; Pt; Y; Zr; C*H⁺O; CH₄; C cp; CH₄-H₂O; C*H; H₂; C*O; CO; C; CO₂; CO-CO₂; H₂-H₂O

L72 ANSWER 49 OF 89 INSPEC (C) 2008 IET on STN
 AN 2001:6991032 INSPEC DN A2001-17-8630G-016; B2001-09-8410G-016 Full-text
 TI Nanoscale features control charge transfer at interfaces in solid oxide fuel cells
 AU McEvoy, A.J. (Dept. of Chem., Ecole Polytech. Federale de Lausanne, Switzerland)
 SO Solid Oxide Fuel Cells (SOFC VI). Proceedings of the Sixth International Symposium, 1999, p. 916-24 of xviii+1200 pp., 21 refs.
 Editor(s): Singhal, S.C.; Dokiya, M.

ISBN: 1 56677 242 7

Published by: Electrochem. Soc, Pennington, NJ, USA

Conference: Proceedings of Solid Oxide Fuel Cells, Honolulu, HI, USA,
17-22 Oct. 1999

DT Conference; Conference Article

TC Practical

CY United States

LA English

AB The bulk properties of the materials chosen for the fabrication of a solid oxide fuel cell provide the functionality, of the electrolyte evidently, but also of the activity towards oxygen and the electronic conductivity which constitute an effective cathode, and of interpenetrating permeation of electronic and ionic transport which gives the volumetric environment for fuel oxidation at an anode. However, as far as cell performance is concerned, aside from the obvious ohmic effects, it is the interfacial processes which dominate, where effects on the nano-scale are determinant for minimisation of polarisation effects and consequently for the achievement of acceptable current densities with low voltage losses, particularly at the lower operating temperatures now sought. These effects are reviewed, with the particular examples of the ceria-zirconia interface in composite electrolytes, and the effects of implanted transition metals at cathode-electrolyte contacts

CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; A6630H Self-diffusion and ionic conduction in solid nonmetals; A8230F Ion-molecule, ion-ion, and charge-transfer reactions; B8410G Fuel cells

CT anodes; cathodes; cerium compounds; charge exchange; electrochemical electrodes; ionic conductivity; polarisation; solid electrolytes; solid oxide fuel cells; zirconium compounds

ST charge transfer control; solid oxide fuel cell interfaces; bulk properties; electronic conductivity; cathode; ionic transport; electronic transport; nanoscale features; volumetric environment; fuel oxidation; anode; ohmic effects; interfacial processes; nano-scale effects; polarisation effects minimisation; low voltage losses; lower operating temperatures; ceria-zirconia interface; composite electrolytes; implanted transition metals; cathode-electrolyte contacts

L72 ANSWER 50 OF 89 INSPEC (C) 2008 IET on STN

AN 2001:6991026 INSPEC DN A2001-17-8630G-010; B2001-09-8410G-010 Full-text

TI High performance SOFCs at temperatures below 700°C

AU Visco, S.J.; Jacobson, C.P.; De Jonghe, L.C. (Div. of Mater. Sci., Lawrence Berkeley Lab., CA, USA)

SO Solid Oxide Fuel Cells (SOFC VI). Proceedings of the Sixth International Symposium, 1999, p. 861-8 of xviii+1200 pp., 5 refs.

Editor(s): Singhal, S.C.; Dokiya, M.

ISBN: 1 56677 242 7

Published by: Electrochem. Soc, Pennington, NJ, USA

Conference: Proceedings of Solid Oxide Fuel Cells, Honolulu, HI, USA,
17-22 Oct. 1999

DT Conference; Conference Article

TC Practical; Experimental

CY United States

LA English

AB Interest in solid oxide fuel cells (SOFCs) capable of reduced temperatures operation has led to a number of innovations in the field of solid state ionics. The capability to fabricate electrode supported structures having thin electrolytes in the range of 5 to 40 μm has been demonstrated by a number of groups worldwide, as well as reports of good performance at intermediate temperatures. It is not yet clear how much the operating temperature can be dropped before electrolyte and electrode kinetic

limitations reduce performance to unacceptably low levels. It is clear that yttria stabilized zirconia electrolyte is not suited to operating temperatures below 700°C. However, alternative electrolyte and electrode materials are available that demonstrate excellent levels of performance at temperatures as low as 600°C. Furthermore, the ability to fabricate both cathode-supported and anode-supported thin-film structures allows for great flexibility in the design of new SOFCs

CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; A6630H
 CT Self-diffusion and ionic conduction in solid nonmetals; B8410G Fuel cells
 ST anodes; cathodes; electrochemical electrodes; electrochemistry;
 solid electrolytes; solid oxide fuel cells; thin films
 high-performance SOFCs; solid oxide fuel cells; solid state ionics;
 electrode supported structures; thin electrolytes; electrochemical
 performance; electrolyte kinetic limitations; electrode kinetic
 limitations; reduced temperature operation; operating temperature;
 electrolyte materials; electrode materials; cathode-supported thin-film
 structures; anode-supported thin-film structures; 5 to 50 μm ; 600 C
 PHP size 5.0E-06 to 5.0E-05 m; temperature 8.73E+02 K
 ET Cs*F*O*S; SOFCs; S cp; cp; O cp; F cp; Cs cp; C

L72 ANSWER 51 OF 89 INSPEC (C) 2008 IET on STN

AN 2001:6991024 INSPEC DN A2001-17-8630G-008; B2001-09-8410G-008 Full-

text

TI Fabrication and characteristics of anode-supported tube for
 solid oxide fuel cell

AU Rak-Hyun Song; (Korea Inst. of Energy Res., Taejon, South Korea),
 Eung-Yong Kim; Dong Ryul Shin; Yokokawa, H.

SO Solid Oxide Fuel Cells (SOFC VI). Proceedings of the Sixth International
 Symposium, 1999, p. 845-50 of xviii+1200 pp., 5 refs.

Editor(s): Singhal, S.C.; Dokiya, M.

ISBN: 1 56677 242 7

Published by: Electrochem. Soc, Pennington, NJ, USA

Conference: Proceedings of Solid Oxide Fuel Cells, Honolulu, HI, USA,
 17-22 Oct. 1999

DT Conference; Conference Article

TC Practical; Experimental

CY United States

LA English

AB As a preliminary experiment for the development of anode -supported tubular
 SOFC with proper porosity, the authors have investigated the anode substrate
 and the electrolyte-coated anode tube. The anode substrate was manufactured
 as a function of carbon content in the range of 20 to 50 volume%. As the
 carbon content increased, the porosity of the anode substrate increased
 slightly and the carbon content with proper porosity was obtained at 30
 volume%. The anode tube was fabricated by an extrusion process and the
 electrolyte layer was coated on the anode tube by slurry dipping process. The
 anode -supported tube was cofired successfully. Their sintered property and
 microstructure were examined. The porosity of the anode tube was 35%. From
 the gas permeation test, the anode tube was found to be porous enough for gas
 supply. On the other hand, the anode -supported tube with electrolyte layer
 indicated a very low gas permeation rate. This means that the coated
 electrolyte was dense. Based upon these experimental results, the authors
 fabricate and test the anode-supported tubular cell

CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; A8120E
 Powder techniques, compaction and sintering; B8410G Fuel cells; B0580
 Powders and porous materials (engineering materials science)

CT anodes; electrochemical electrodes; electrochemistry;
 electrolytes; sintering; solid oxide fuel cells

ST solid oxide fuel cell; anode-supported tube; fabrication;
 characteristics; SOFC; anode substrate; electrolyte-coated anode tube;

extrusion process; electrolyte layer; slurry dipping process; sintered property; microstructure; gas permeation test; gas permeation rate

L72 ANSWER 52 OF 89 INSPEC (C) 2008 IET on STN
AN 2001:6983972 INSPEC DN A2001-16-8630G-086; B2001-08-8410G-113 Full-text

TI Electrical characterization of a chromium alloy interconnect material
AU Liebert, B.E. (Hawaii Univ., Honolulu, HI, USA)
SO Solid Oxide Fuel Cells (SOFC VI). Proceedings of the Sixth International Symposium, 1999, p. 722-30 of xviii+1200 pp., 7 refs.
Editor(s): Singhal, S.C.; Dokiya, M.
ISBN: 1 56677 242 7
Published by: Electrochem. Soc, Pennington, NJ, USA
Conference: Proceedings of Solid Oxide Fuel Cells, Honolulu, HI, USA, 17-22 Oct. 1999

DT Conference; Conference Article

TC Experimental

CY United States

LA English

AB The electrical properties of a high-chromium alloy proposed for use as an interconnect material for intermediate temperature solid oxide fuel cells were studied by impedance spectroscopy and four-point resistance techniques. The increasing resistance with time complicated measurement of the resistance in air at moderate temperatures. Even at temperatures as low as 200°C, the resistance of the metal noticeably increased with time. Two samples were heated at 1000°C for 75 hours in air in an effort to simulate the effect of a long-term exposure at 500°C. The samples developed a semiconducting film with a resistance sufficiently large, even at 500°C, to prevent this alloy from being used as an interconnect material by itself. It is possible that a coating may be able to maintain a low contact resistance throughout the lifetime of the cell

CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; B8410G Fuel cells

CT anodes; cathodes; chromium alloys; contact resistance; electrochemical electrodes; electrochemistry; electrolytes; solid oxide fuel cells

ST Cr alloy interconnect material; electrical characterization; intermediate-temperature solid oxide fuel cells; impedance spectroscopy; four-point resistance techniques; long-term exposure; SOFC; semiconducting film; contact resistance; 200 C; 1000 C; 75 h; 500 C

CHI Cr int, Cr bin

PHP temperature 4.73E+02 K; temperature 1.27E+03 K; time 2.7E+05 s;

ET temperature 7.73E+02 K

Cr; C

L72 ANSWER 53 OF 89 INSPEC (C) 2008 IET on STN
AN 1999:6368239 INSPEC DN A1999-21-8630G-004; B1999-11-8410G-005 Full-text

TI A direct-methane fuel cell with a ceria-based anode
AU Perry Murray, E.; Tsai, T.; Barnett, S.A. (Dept. of Mater. Sci. & Eng., Northwestern Univ., Evanston, IL, USA)
SO Nature (12 Aug. 1999), vol.400, no.6745, p. 649-51, 18 refs.
CODEN: NATUAS, ISSN: 0028-0836
SICI: 0028-0836(19990812)400:6745L:649:DMFC;1-T
Price: 0028-0836/99/\$12.00+2.00
Published by: Macmillan Magazines, UK

DT Journal

TC Experimental

CY United Kingdom

LA English

- AB Fuel cells constitute an attractive power generation technology that converts chemical energy directly and with high efficiency into electricity while causing little pollution. Most fuel cells require hydrogen as the fuel, but viable near-term applications will need to use the more readily available hydrocarbons, such as methane. Present-day demonstration power plants and planned fuel-cell electric vehicles therefore include a reformer that converts hydrocarbon fuel into hydrogen. Operating fuel cells directly on hydrocarbons would obviously eliminate the need for such a reformer and improve efficiency. In the case of polymer-electrolyte fuel cells, which have been studied for vehicle applications, the direct use of methanol fuel has been reported, but resulted in fuel permeating the electrolyte. Solid oxide fuel cells—promising candidates for stationary power generation—can also use hydrocarbon fuel directly to generate energy, but this mode of operation resulted in either carbon deposition at high temperatures or poor power output at low operating temperatures. Here, the authors report the direct electrochemical oxidation of methane in solid oxide fuel cells that generate power densities up to 0.37 W cm⁻² at 650°C. This performance is comparable to that of fuel cells using hydrogen and is achieved by using ceria-containing anodes and low operating temperatures to avoid carbon deposition. They expect that the incorporation of more advanced cathodes would further improve the performance of their cells, making this solid oxide fuel cell a promising candidate for practical and efficient fuel-cell applications
- CC A8630G Fuel cells; A8610B Fossil and other fuels; A8245 Electrochemistry and electrophoresis; B8410G Fuel cells
- CT anodes; cerium compounds; electrochemical electrodes; electrochemistry; fuel; oxidation; solid oxide fuel cells
- ST direct-methane fuel cell; ceria-based anode; power generation technology; demonstration power plants; electric vehicles; direct electrochemical oxidation; hydrocarbon fuel; operating temperature; solid oxide fuel cell; advanced cathodes; CeO₂
- CHI CeO₂ int, Ce int, O₂ int, O int, CeO₂ bin, Ce bin, O₂ bin, O bin
- ET O; Ce; Ce*O; CeO; Ce cp; cp; O cp; C
- L72 ANSWER 54 OF 89 INSPEC (C) 2008 IET on STN
- AN 2001:6983959 INSPEC DN A2001-16-8630G-073; B2001-08-8410G-100 Full-text
- TI Ceria catalyst for the internal reforming of biogas in a small tubular solid oxide fuel cell system
- AU Staniforth, J.; Kendall, K. (Birchall Centre, Keele Univ., UK)
- SO Solid Oxide Fuel Cells (SOFC VI). Proceedings of the Sixth International Symposium, 1999, p. 603-11 of xviii+1200 pp., 8 refs.
- Editor(s): Singhal, S.C.; Dokiya, M.
- ISBN: 1 56677 242 7
- Published by: Electrochem. Soc, Pennington, NJ, USA
- Conference: Proceedings of Solid Oxide Fuel Cells, Honolulu, HI, USA, 17-22 Oct. 1999
- DT Conference; Conference Article
- TC Experimental
- CY United States
- LA English
- AB A perennial problem with carbon based fuels such as methane in SOFCs is that of carbon deposition or 'coking up'. Biogas, a complex and variable mixture of methane, carbon dioxide and other gases; is a high carbon content fuel and so is no exception to this general rule. In this paper, ceria is shown to be an effective catalyst preventing carbon deposition within a solid oxide fuel cell system powered by air reformed biogas. Analysis of the exhaust gases was performed by gas chromatography. This showed that addition of ceria to the anode increased reforming activity at the operating temperatures of the cells with a higher conversion rate of methane to hydrogen and carbon monoxide than

- for an undoped anode. The addition of ceria to the anode lessens power fluctuations and greatly increases the length of time that a cell can run before coking up. Further experiments are testing the longer term performance
- CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; A8265J Heterogeneous catalysis at surfaces and other surface reactions; A8610B Fossil and other fuels; A8280B Chromatography; B8410G Fuel cells
- CT anodes; bioenergy conversion; carbon; catalysis; catalysts; cerium compounds; chromatography; electrochemical electrodes; electrochemistry; fuel; solid oxide fuel cells
- ST small tubular solid oxide fuel cell system; biogas internal reforming; SOFC; carbon deposition prevention; high carbon content fuel; CeO2 catalyst; gas chromatography; power fluctuations; longer term performance; electrochemical performance; CeO2
- CHI CeO2 bin, Ce bin, O2 bin, O bin
- ET O2; O; Ce; Cs*F*O*S; SOFCs; S cp; cp; O cp; F cp; Cs cp
- L72 ANSWER 55 OF 89 INSPEC (C) 2008 IET on STN
- AN 2001:6983952 INSPEC DN A2001-16-8630G-066; B2001-08-8410G-093 Full-text
- TI Novel highly titania doped YSZ anodes for SOFCs
- AU Kaiser, A.; Feighery, A.J.; Irvine, J.T.S. (Sch. of Chem., St. Andrews Univ., UK)
- SO Solid Oxide Fuel Cells (SOFC VI). Proceedings of the Sixth International Symposium, 1999, p. 541-8 of xviii+1200 pp., 12 refs. Editor(s): Singhal, S.C.; Dokiya, M. ISBN: 1 56677 242 7 Published by: Electrochem. Soc, Pennington, NJ, USA Conference: Proceedings of Solid Oxide Fuel Cells, Honolulu, HI, USA, 17-22 Oct. 1999
- DT Conference; Conference Article
- TC New Development; Experimental
- CY United States
- LA English
- AB In the ternary system ZrO2-Y2O3-TiO2 compositions with titania concentrations of 18 mol-% can be dissolved in the cubic fluorite structure. The electrical properties of these compositions close to the high titania, low yttria limit were found to have a predominant ionic conductivity of about 0.01 S_{cm}⁻¹. Substantial electronic conductivity of about 0.2 S_{cm}⁻¹ at 930°C is introduced into the system at oxygen pressures below 10⁻¹³ atmospheric. For applications in the SOFC, I-V polarisation studies were performed on anode compositions, screen printed on YSZ electrolytes, using a gold mesh current collector. A low effective contact area of about 20% of the geometrical area suggested that these materials need to be supplemented by a current collecting component. With increasing polarisation of the electrode, the effective contact area decreased due to oxidation of the electrode. However currents, related to the effective contact area were reasonable. By impedance studies the polarisation losses were associated with the electrode and electrolyte resistances, diffusion and charge transfer losses were not very large, perhaps indicating the benefit of an ionically conducting electrode
- CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; A6630H Self-diffusion and ionic conduction in solid nonmetals; A8230F Ion-molecule, ion-ion, and charge-transfer reactions; B8410G Fuel cells
- CT anodes; charge exchange; electrical conductivity; electrochemical electrodes; ionic conductivity; losses; polarisation; solid electrolytes; solid oxide fuel cells; titanium compounds; yttrium compounds; zirconium compounds
- ST highly titania doped YSZ anodes; SOFC; ZrO2-Y2O3-TiO2 compositions; cubic fluorite structure; electrical properties; ionic conductivity; electronic conductivity; oxygen pressures; I-V polarisation studies; screen printed anodes; gold mesh current collector; low effective contact area; current

collecting component; electrode polarisation; effective contact area; polarisation losses; electrolyte resistances; diffusion; charge transfer losses; ionically conducting electrode; 930 C; ZrO₂-Y₂O₃-TiO₂

CHI ZrO₂Y₂O₃TiO₂ ss, O₂ ss, O₃ ss, Ti ss, Y₂ ss, Zr ss, O ss, Y ss

PHP temperature 1.20E+03 K

ET O*Ti*Y; O sy 3; sy 3; Ti sy 3; Y sy 3; Y₂O₃; Y cp; cp; O cp; TiO₂; Ti cp; O₂-Y₂O₃-TiO₂; V; O₂Y₂O₃TiO; O; Ti; Y; Zr; Cs*F*O*S; SOFCs; S cp; F cp; Cs cp; O*Ti*Y*Zr; O sy 4; sy 4; Ti sy 4; Y sy 4; Zr sy 4; ZrO₂; Zr cp; ZrO₂-Y₂O₃-TiO₂; C; I*V; I-V

L72 ANSWER 56 OF 89 INSPEC (C) 2008 IET on STN

AN 2001:6983948 INSPEC DN A2001-16-8630G-062; B2001-08-8410G-089 Full-text

TI Solid oxide fuel cell performance studies: anode development

AU Huebner, W.; Reed, D.M.; Anderson, H.U. (Dept. of Ceramic Eng., Missouri Univ., Rolla, MO, USA)

SO Solid Oxide Fuel Cells (SOFC VI). Proceedings of the Sixth International Symposium, 1999, p. 503-12 of xviii+1200 pp., 9 refs. Editor(s): Singhal, S.C.; Dokiya, M. ISBN: 1 56677 242 7 Published by: Electrochem. Soc, Pennington, NJ, USA Conference: Proceedings of Solid Oxide Fuel Cells, Honolulu, HI, USA, 17-22 Oct. 1999

DT Conference; Conference Article

TC Experimental

CY United States

LA English

AB In this research the microstructure X21CC property relations in solid oxide fuel cells (SOFCs) are being studied to better understand the mechanisms involved in cell performance. The overall aim is to fabricate SOFCs with controlled, stable, high performance microstructures. In this paper, anodic studies are presented which exhibit the influence of starting powder characteristics, processing conditions and composition on the electrical conductivity and overpotential

CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; A6630H Self-diffusion and ionic conduction in solid nonmetals; B8410G Fuel cells

CT anodes; electrochemical electrodes; electrochemistry; solid electrolytes; solid oxide fuel cells; superionic conductivity

ST solid oxide fuel cell; SOFC; electrochemical performance studies; anode development; starting powder characteristics; processing conditions; electrical conductivity; overpotential; microstructure-property relations; composition

ET Cs*F*O*S; SOFCs; S cp; cp; O cp; F cp; Cs cp

L72 ANSWER 57 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN DUPLICATE 3

AN 1999:673199 HCAPLUS Full-text

DN 131:312395

ED Entered STN: 22 Oct 1999

TI Statistical geometry of reaction space in porous catalyst anodes based on ion-conducting electrolytes. Patterns of degradation

AU Ioselevich, A.; Kornyshev, A. A.; Lehnert, W.

CS Institut fur Theoretische Physik, Physik Zentrum, Rheinisch-Westfalische Technische Hochschule, Aachen, D-52062, Germany

SO Solid State Ionics (1999), 124(3,4), 221-237 CODEN: SSIOD3; ISSN: 0167-2738

PB Elsevier Science B.V.

DT Journal

LA English

- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72
- AB The statistical geometry of the electrochem. active triple-phase boundary in solid oxide fuel cell (SOFC) anodes with oxygen-ion-conducting (zirconia type) electrolyte is analyzed by means of an "effective-medium" theory and verified by Monte Carlo simulations. Variation of the triple-phase boundary with time due to spontaneous sintering of metal particles is described by kinetic effective-medium equations. Their solution reveals possible degradation scenarios, as well as the factors that impede degradation, or even cause a rise of the active triple-phase boundary in the course of SOFC operation. The cermet composition, i.e. the relative portion of electrolyte, metal and pores, is among these factors. It is shown that the "best" composition before degradation may not be the one that provides the best performance after degradation. The latter depends on the probability of pore opening in sintering of two metal grains. Rough ests. of this probability (and determination of the "optimum" composition) would be possible from a comparison of the calculated porosity before and after degradation with exptl. data, which are not available so far.
- ST solid oxide fuel cell
anode reaction; statistical geometry triple phase boundary
anode; zirconia electrolyte fuel cell
anode degradn
- IT Simulation and Modeling, physicochemical
(Monte Carlo; statistical geometry of reaction space in porous cermet anodes based on ion-conducting electrolytes; patterns of degradation)
- IT Electrolytes
Fuel cell anodes
Solid state fuel cells
(statistical geometry of reaction space in porous cermet anodes based on ion-conducting electrolytes; patterns of degradation)
- IT 1314-23-4, Zirconium oxide (ZrO₂), uses
RL: DEV (Device component use); USES (Uses)
(electrolyte; statistical geometry of reaction space in porous cermet anodes based on ion-conducting electrolytes; patterns of degradation)
- RE.CNT 11 THERE ARE 11 CITED REFERENCES AVAILABLE FOR THIS RECORD
- RE
(1) Abel, J; J Electrochem Soc 1997, V144, P4253 HCAPLUS
(2) Appleby, J; Fuel Cell Handbook 1993
(3) Blomen, L; Fuel Cell Systems 1993
(4) Chizmadjev, Y; Macro-kinetics of Processes in Porous Media (Fuel Cells), Chap 7 1971
(5) Costamagna, P; Electrochim Acta 1998, V43, P375 HCAPLUS
(6) Frumkin, A; Zh Fiz Khim 1949, V23, P1477 HCAPLUS
(7) Ioselevich, A; J Electrochem Soc 1997, V144, P3010
(8) Kenjo, T; J Electrochem Soc 1991, V138, P349 HCAPLUS
(9) Minh, N; J Am Ceram Soc 1993, V76, P563 HCAPLUS
(10) Stauffer, D; Introduction to Percolation Theory 1992
(11) Sunde, S; J Electrochem Soc 1996, V143, P1123 HCAPLUS

L72 ANSWER 58 OF 89 INSPEC (C) 2008 IET on STN
AN 1999:6393183 INSPEC DN A1999-23-8630G-013; B1999-12-8410G-014 Full-
text
TI Investigation of the performance of CH₄ oxidation at SOFC
anode
AU Ma Zifeng; Huang Bichun; Liao Xiaozhen; Leng Yongjun (Dept. of Chem.

- Eng., Shanghai Jiaotong Univ., China)
Chinese Journal of Power Sources (1999), vol.23, no.3, p. 164-6, 197, 10 refs.
CODEN: DIJIFT, ISSN: 1002-087X
SICI: 1002-087X(1999)23:3L:164:IP0S;1-E
Published by: Tianjin Inst. Power Sources, China
- DT Journal
TC Experimental
CY China
LA Chinese
- AB Preliminary experimental results on the reaction of CH₄ oxidation at solid oxide fuel cell (SOFC) anode are reported. The results show that there are several reaction mechanisms during the CH₄ oxidation at SOFC anode. The real reaction mechanism of the CH₄ oxidation has relevance to the temperature and space velocity. The conversion and yield of H₂ and CO increase when the temperature increases. The CH₄ oxidation at SOFC is partial oxidation. The amount of CO and/or H₂ formed decreases with the increase of space velocity, while CH₄ conversion decreases. Carbon deposit was diagnosed during the oxidation of dry methane at SOFC anode. The carbon deposit can be removed by humidifying the methane or burning it with oxygen. The influence of NEMCA effect on the output current of the cell was also studied
- CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; A8230 Specific chemical reactions; reaction mechanisms; B8410G Fuel cells
- CT anodes; electrochemical electrodes; oxidation; solid oxide fuel cells
- ST CH₄ oxidation; SOFC anode; solid oxide fuel cell; reaction mechanisms; space velocity; CO formation; H₂ formation; carbon deposit diagnosis; dry methane; methane humidification; methane burning; NEMCA effect; output current
- ET C*H; CH₄; C cp; cp; H cp; H₂; C*O; CO; O cp
- L72 ANSWER 59 OF 89 INSPEC (C) 2008 IET on STN
- AN 2000:6769699 INSPEC DN A2001-01-8630G-003; B2001-01-8410G-003 Full-text
- TI Interactions between LaGaO₃ based SOFC oxide electrolyte and ceria based anode
- AU Hrovat, M.; Samardzija, Z.; (Jozef Stefan Inst., Ljubljana Univ., Slovenia); Ahmad-Khanlou, A.; Holc, J.
- SO 35th International Conference on Microelectronics, Devices and Materials and Workshop on Microsystems. MIDECON. Conference'99. Proceedings, 1999, p. 71-6 of x+318 pp., 16 refs.
Editor(s): Amon, S.; Trontelj, L.; Sorli, I.
ISBN: 961 90001 7 X
Published by: MIDECON - Soc. Microelectron. Electron. Components & Mater, Dunajska, Slovenia
Conference: 35th International Conference on Microelectronics, Devices and Materials and Workshop on Microsystems. MIDECON. Conference '99. Proceedings, Ljubljana, Slovenia, 13-15 Oct. 1999
Sponsor(s): Ministr. Sci. & Technol.; Iskra tovarna kondenzatorjev Semic; Jozef Stefan Inst.; et al
- DT Conference; Conference Article
TC Practical; Experimental
CY Slovenia
LA English
- AB Possible interactions between Sr and Mg doped LaGaO₃ (solid electrolyte) and Ce_{0.8}Gd_{0.2}O_{1.9} (the binding phase in a solid oxide fuel cell (SOFC) anode) were studied. Diffusion couples were fired at 1300°C and analysed by SEM and EDX. The formation of a reacted layer with a Sr:La:Ga element ratio of 1:1:3, corresponding to the SrLaGa₃O₇ compound, was detected. SrLaGa₃O₇

was synthesised and its resistivity temperature dependence was measured. The resistivity is high, around 1 MΩcm at 800°C and a few hundreds of kΩcm at 900°C. The long term stability of the characteristics of an SOFC using an LSGM based solid electrolyte with doped CeO₂ as a binding phase in the anode could therefore be impaired due to the formation of this high resistance layer on the anode/solid electrolyte interface

CC A8630G Fuel cells; A6630H Self-diffusion and ionic conduction in solid nonmetals; A6630N Chemical interdiffusion in solids; B8410G Fuel cells

CT anodes; cerium compounds; chemical interdiffusion; electrical resistivity; gadolinium; gallium compounds; lanthanum compounds; magnesium; solid electrolytes; solid oxide fuel cells; stability; strontium; surface chemistry

ST LaGaO₃ based SOFC oxide electrolyte; ceria based anode; SOFC oxide electrolyte/anode interactions; Sr/Mg doped LaGaO₃ solid electrolyte; Ce_{0.8}Gd_{0.2}O_{1.9} binding phase; solid oxide fuel cell anode; SOFC anode; diffusion couple firing; SEM; EDX; reacted layer formation; Sr:La:Ga element ratio; SrLaGa307 compound; SrLaGa307 synthesis; resistivity temperature dependence; resistivity; long term stability; LSGM based solid electrolyte; SOFC; doped CeO₂ anode binding phase; high resistance layer; anode/solid electrolyte interface; 1300 C; 800 C; 900 C; 1 Mohmcm; LaGaO₃:Sr,Mg-Ce_{0.8}Gd_{0.2}O_{1.9}; SrLaGa307

CHI LaGaO₃:Sr,Mg-Ce_{0.8}Gd_{0.2}O_{1.9} int, Ce_{0.8}Gd_{0.2}O_{1.9} int, LaGaO₃:Sr,Mg int, LaGaO₃ int, Ce_{0.8} int, Gd_{0.2} int, O_{1.9} int, Ce int, Ga int, Gd int, La int, Mg int, O₃ int, Sr int, O int, Ce_{0.8}Gd_{0.2}O_{1.9} ss, LaGaO₃:Sr,Mg ss, LaGaO₃ ss, Ce_{0.8} ss, Gd_{0.2} ss, O_{1.9} ss, Ce ss, Ga ss, Gd ss, La ss, Mg ss, O₃ ss, Sr ss, O ss, Mg el, Sr el, Mg dop, Sr dop; SrLaGa307 int, Ga₃ int, Ga int, La int, O₇ int, Sr int, O int, SrLaGa307 ss, Ga₃ ss, Ga ss, La ss, O₇ ss, Sr ss, O ss

PHP temperature 1.57E+03 K; temperature 1.07E+03 K; temperature 1.17E+03 K; resistivity 1.0E+04 ohm*m

ET Ga*O; GaO₃; Ga cp; cp; O cp; Ga*La*O; Ga sy 3; sy 3; La sy 3; O sy 3; LaGaO₃; La cp; Gd*O; Gd_{0.2}O_{1.9}; Gd cp; Ga*La; Ga sy 2; sy 2; La sy 2; La:Ga; Ga doping; doped materials; LaGa307; Ce*O; CeO₂; Ce cp; Ga*O*Sr; Sr sy 3; GaO₃:Sr; Sr doping; Ce*Gd*Mg*O; Ce sy 4; sy 4; Gd sy 4; Mg sy 4; O sy 4; Ce_{0.8}Gd_{0.2}O_{1.9}; Mg-Ce_{0.8}Gd_{0.2}O_{1.9}; GaO; Sr; Ce_{0.8}Gd_{0.2}O; Mg-Ce_{0.8}Gd_{0.2}O; Ce*Gd*O; Ce sy 3; Gd sy 3; LaGaO; Mg; Ce; Gd; O; Ga; La; LaGa30; Ga*La*O*Sr; Ga sy 4; La sy 4; Sr sy 4; SrLaGa30; Sr cp; C; Ga*La*Sr; Sr:La:Ga; La:Ga doping; SrLaGa307

L72 ANSWER 60 OF 89 INSPEC (C) 2008 IET on STN

AN 2001:6983897 INSPEC DN A2001-16-86306-017; B2001-08-8410G-042 Full-text

TI Status of the Sulzer Hexis product development

AU Diethelm, R.; Schmidt, M.; (Sulzer Hexis Ltd, Winterthur, Switzerland), Honegger, K.; Batawi, E.

SO Solid Oxide Fuel Cells (SOFC VI). Proceedings of the Sixth International Symposium, 1999, p. 60-7 of xviii+1200 pp., 7 refs. Editor(s): Singhal, S.C.; Dokiya, M. ISBN: 1 56677 242 7 Published by: Electrochem. Soc, Pennington, NJ, USA Conference: Proceedings of Solid Oxide Fuel Cells, Honolulu, HI, USA, 17-22 Oct. 1999

DT Conference; Conference Article

TC General Review

CY United States

LA English

AB Sulzer has been involved, since 1991, in the development of SOFC (solid oxide fuel cell) technology. Founded in 1997, Sulzer Hexis Ltd. is preparing the market entry of fuel cell systems for residential applications. Such systems will supply

the basic electrical power of single and multi family houses. The exhaust gas from the fuel cell module is coupled with a conventional heating/cooling unit. This combination of electricity and heat production is the key to a more efficient utilization of fossil fuels. It exceeds by far the combination of conventional central power stations and decentralized heating equipment. From 1998 to 2000, Sulzer Hexis will perform field tests. Several gas suppliers and city utilities in Switzerland, Germany and Japan are supporting these efforts. With the help of the experience gained from the current field tests, Sulzer Hexis is developing a prototype fuel cell unit which will be launched in the market in 2001

- CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; B8410G Fuel cells; B8255 Fuel cell power plants; B0170 Project and production engineering; E1400 Design
- CT anodes; cathodes; current density; electrochemical electrodes; electrochemistry; electrolytes; fuel cell power plants; product development; solid oxide fuel cells
- ST Sulzer Hexis; product development status; residential applications; SOFC technology; solid oxide fuel cell; fossil fuels; utilities; power plants
- L72 ANSWER 61 OF 89 INSPEC (C) 2008 IET on STN
- AN 2001:6983894 INSPEC DN A2001-16-8630G-014; B2001-08-8410G-039 Full-text
- TI Status of Danish solid oxide fuel cell R&D
- AU Bagger, C.; Linderroth, S.; Mogensen, M.; Hendriksen, P.V.; Kindl, B.; Primdahl, S.; Larsen, P.H.; Poulsen, F.W.; Bonanos, N.; Jorgensen, M.J. (Dept. of Mater., Riso Nat. Lab., Roskilde, Denmark)
- SO Solid Oxide Fuel Cells (SOFC VI). Proceedings of the Sixth International Symposium, 1999, p. 28-35 of xviii+1200 pp., 12 refs. Editor(s): Singhal, S.C.; Dokiya, M. ISBN: 1 56677 242 7 Published by: Electrochem. Soc, Pennington, NJ, USA Conference: Proceedings of Solid Oxide Fuel Cells, Honolulu, HI, USA, 17-22 Oct. 1999
- DT Conference; Conference Article
- TC General Review
- CY United States
- LA English
- AB The Danish Solid Oxide Fuel Cell Program was established to develop materials, structures and process knowledge with parallel implementation into design, modelling and fabrication technologies. Main achievements of the program are mentioned with emphasis on recent results with ceramic interconnect and electrodes for operation at 750-850°C. A thin anode supported cell of mainly traditional materials, with thin electrolyte and high handling strength was developed recently using cost effective fabrication techniques suited for scale up. Area specific resistances are around 0.4 $\Omega \cdot \text{cm}^2$ at 850°C and 0.8 $\Omega \cdot \text{cm}^2$ at 750°C and remedies for further improvement have been identified. Future development projects will include redox stable anode current collectors, durability issues with special attention to aging mechanisms with high current densities and reproducibility in fabrication. A new development program will investigate the possibilities of syngas production from simultaneous electrolysis of steam and CO₂ with the primary aim of enabling storage of renewable energy
- CC A8630G Fuel cells; A8245 Electrochemistry and electrophoresis; B8410G Fuel cells; E1030 Research and development
- CT anodes; electrochemical electrodes; electrochemistry; electrolytes; research initiatives; solid oxide fuel cells
- ST solid oxide fuel cell; R&D status; Denmark; materials; structures; process knowledge; electrolyte; handling strength; cost effective

- fabrication techniques; SOFC; 750 to 850 C; CO₂
- CHI CO₂ bin, O₂ bin, C bin, O bin
- PHP temperature 1.02E+03 to 1.12E+03 K
- ET O; C; C*O; CO₂; C cp; cp; O cp
- L72 ANSWER 62 OF 89 INSPEC (C) 2008 IET on STN
- AN 2001:6983890 INSPEC DN A2001-16-0130C-051; B2001-08-0100-102 [Full-text](#)
- TI Solid Oxide Fuel Cells (SOFC VI). Proceedings of the Sixth International Symposium
- AU Editor(s): Singhal, S.C.; Dokiya, M.
- SO 1999, xviii+1200 pp.
ISBN: 1 56677 242 7
Published by: Electrochem. Soc, Pennington, NJ, USA
Conference: Proceedings of Solid Oxide Fuel Cells, Honolulu, HI, USA, 17-22 Oct. 1999
- DT Conference Proceeding
- CY United States
- LA English
- AB The following topics were dealt with: solid oxide fuel cells status; SOFC systems; electrolyte materials; cathode materials; anode materials; interconnection materials; stack design; fabrication; and modeling
- CC A0130C Conference proceedings; A8630G Fuel cells; A6630H Self-diffusion and ionic conduction in solid nonmetals; A8245 Electrochemistry and electrophoresis; B0100 General electrical engineering topics; B8410G Fuel cells
- CT anodes; cathodes; electrochemical electrodes; solid electrolytes; solid oxide fuel cells
- ST solid oxide fuel cells status; SOFC systems; electrolyte materials; cathode materials; anode materials; interconnection materials; stack design; fabrication; modeling
- L72 ANSWER 63 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN DUPLICATE 4
- AN 1998:607761 HCAPLUS [Full-text](#)
- DN 129:205155
- ED Entered SIN: 25 Sep 1998
- TI A controlled solid state diffusion process to form cermet anodes for solid oxide fuel cells
- AU Tang, Eric Z.; Ivey, Douglas G.; Etsell, Thomas H.
- CS Department of Chemical and Materials Engineering, University of Alberta, Edmonton, AB, T6G 2G6, Can.
- SO Materials Research Society Symposium Proceedings (1998), 527(Diffusion Mechanisms in Crystalline Materials), 539-544
CODEN: MRSPDH; ISSN: 0272-9172
- PB Materials Research Society
- DT Journal
- LA English
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72
- AB The interfacing of thin film vapor deposition technologies and solid state electrochem. has led to the recent development of polarized electrochem. vapor deposition (PEVD). In this study, PEVD was applied to deposit a thin layer of yttria stabilized zirconia (YSZ) over a porous metallic electrode to form the cermet anode of a solid oxide fuel cell (SOFC). During PEVD, oxygen ions are transported through the solid electrolyte of an SOFC under an elec. potential gradient provided by an external dc source. At the metallic electrode (anode) surface, oxygen ions react electrochem. with ZrCl₄ and YCl₃ in the vapor phase to deposit YSZ. The growth of YSZ resembles the mechanisms illustrated in Wagner's tarnishing theory. However,

modification has been made to the initial growth of YSZ at both electronically and ionically shorted paths along the metallic electrode and solid electrolyte surfaces, resp. The initial exptl. results in the present study showed that PEVD is capable of depositing a thin layer of YSZ on a porous metallic electrode to form a cermet anode. This layer not only provides a continuous ionic conducting path in the anode to reduce the overpotential loss, but also protects the metallic electrode from further sintering, vapor loss and poisoning in the harsh SOFC operating conditions.

- ST fuel cell cermet anode
fabrication; diffusion solid state anode fabrication
- IT Vapor deposition process
(chemical, electrochem., polarized; controlled solid state diffusion process to form cermet anodes for solid oxide fuel cells)
- IT Cermet
Diffusion
Fuel cell anodes
Solid state fuel cells
(controlled solid state diffusion process to form cermet anodes for solid oxide fuel cells)
- IT Electrodeposition
(polarized electrochem. vapor deposition; controlled solid state diffusion process to form cermet anodes for solid oxide fuel cells)
- IT 1314-36-9, Yttria, uses
RL: DEV (Device component use); USES (Uses)
(ZrO2 stabilized with; controlled solid state diffusion process to form cermet anodes for solid oxide fuel cells)
- IT 7440-06-4, Platinum, uses 64417-98-7, Yttrium zirconium oxide 143181-37-7, Ytterbium yttrium zirconium oxide Yb0.16Y0.12Zr0.86O2.14
RL: DEV (Device component use); USES (Uses)
(controlled solid state diffusion process to form cermet anodes for solid oxide fuel cells)
- IT 212121-41-0P
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(controlled solid state diffusion process to form cermet anodes for solid oxide fuel cells)
- IT 10026-11-6, Zirconium tetrachloride 10361-92-9, Yttrium trichloride
RL: RCT (Reactant); RACT (Reactant or reagent)
(precursor; controlled solid state diffusion process to form cermet anodes for solid oxide fuel cells)
- IT 1314-23-4, Zirconia, uses
RL: DEV (Device component use); USES (Uses)
(yttria-stabilized; controlled solid state diffusion process to form cermet anodes for solid oxide fuel cells)

RE.CNT 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE

- (1) Baur, E; Z Elektrochem 1937, V43, P727 HCAPLUS
- (2) Dees, D; J Electrochem Soc 1987, V134, P2
- (3) Iischner-Gensch, C; J Electrochem Soc 1958, V105, P198 HCAPLUS
- (4) Inoue, T; Solid State Ionics 1990, V40/41, P407
- (5) Isenberg, A; US 4597170 1986 HCAPLUS
- (6) Isenberg, A; Proc Symp On Electrode Materials and Processes for Energy

Conversion and Storage, Electrochem Soc Proc 77-6 1977, P572 HCAPLUS

(7) Kawada, T; Solid State Ionics 1990, V40/41, P402

(8) Suzuki, M; Solid State Ionics 1993, V62, P125 HCAPLUS

(9) Tang, E; Electrochemical Deposited Thin Film III, Electrochem Soc Proc 96-19 1996, P71

L72 ANSWER 64 OF 89 INSPEC (C) 2008 IET on STN

AN 1999:6192739 INSPEC DN A1999-08-8630G-005; B1999-04-8410G-018 Full-

text

TI La0.6Sr0.4Co0.2Fe0.8O3 as an anode for direct methane activation in SOFCs

AU Weston, M.; Metcalfe, I.S. (Dept. of Chem. Eng., Edinburgh Univ., UK)

SO Solid State Ionics, Diffusion & Reactions (Dec. 1998), vol.113-115, p. 247-51, 6 refs.

CODEN: SSIOD3, ISSN: 0167-2738

SICI: 0167-2738(199812)113/115L:247:642A;1-0

Price: 0167-2738/98/\$19.00

Doc.No.: S0167-2738(98)00377-4

Published by: Elsevier, Netherlands

Conference: 11th International Conference on Solid State Ionics, Honolulu, HI, USA, 16-21 Nov. 1997

DT Conference; Conference Article; Journal

TC Experimental; Practical

CY Netherlands

LA English

AB This study aims to investigate the use of La0.6Sr0.4Co0.2Fe0.8O3 as a prospective anode material that can operate directly off methane fuel. The reaction of methane over the material has been investigated using a novel measurement system to obtain simultaneous catalytic and gravimetric information. This gravimetric system relies on sensing the change in the natural frequency of a quartz tube that houses the catalyst sample and allows a wide range of in-situ gravimetric experiments to be performed. The weight loss suffered by the catalyst indicates some potential degree of thermal instability with the reduction of oxide occurring as vacancies are produced. The results effectively show how increasing defect concentration effects catalytic activity and selectivity during reaction over a LSCFO oxide surface

CC A8630G Fuel cells; A8220P Measurements of chemical rate constants, reaction cross sections, and activation energies; A8245 Electrochemistry and electrophoresis; A8265J Heterogeneous catalysis at surfaces and other surface reactions; B8410G Fuel cells

CT anodes; catalysis; catalysts; electrochemical electrodes; lanthanum compounds; organic compounds; oxidation; reaction kinetics; reduction (chemical); solid oxide fuel cells; strontium compounds; surface chemistry; thermal stability; vacancies (crystal); weighing

ST solid oxide fuel cells; methane fuel; anode; methane activation; gravimetric measurements; reaction kinetics; simultaneous measurement system; quartz tube natural frequency; catalyst weight loss; thermal instability; oxide reduction; vacancies production; defect concentration; catalytic selectivity; Kroeger-Vink equations; temperature-programmed reduction; methane combustion; methane decomposition; reduction rate measurement; 600 C; La0.6Sr0.4Co0.2Fe0.8O3

CHI La0.6Sr0.4Co0.2Fe0.8O3 sur, Co0.2 sur, Fe0.8 sur, La0.6 sur, Sr0.4 sur, Co sur, Fe sur, La sur, O3 sur, Sr sur, O sur, La0.6Sr0.4Co0.2Fe0.8O3 ss, Co0.2 ss, Fe0.8 ss, La0.6 ss, Sr0.4 ss, Co ss, Fe ss, La ss, O3 ss, Sr ss, O ss

PHP temperature 8.73E+02 K

ET Co*Fe*O*Sr; Co sy 4; sy 4; Fe sy 4; O sy 4; Sr sy 4; Sr0.4Co0.2Fe0.8O3; Sr cp; cp; Co cp; Fe cp; O cp; Sr0.4Co0.2Fe0.8O; Co; Fe; La; Sr; O; Co*Fe*La*O*Sr; Co sy 5; sy 5; Fe sy 5; La sy 5; O sy 5; Sr sy 5;

La_{0.6}Sr_{0.4}Co_{0.2}Fe_{0.8}O₃; La cp; La_{0.6}Sr_{0.4}Co_{0.2}Fe_{0.8}O₃

L72 ANSWER 65 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1998:277973 HCAPLUS Full-text

DN 128:296890

ED Entered STN: 14 May 1998

TI Process engineering analysis of electrochemical energy conversion systems

AU Divisek, J.

CS Inst. Energieverfahrenstechnik, Forschungszentrum Juelich G.m.b.H., Juelich, D-52425, Germany

SO Berichte des Forschungszentrums Juelich (1997), Juel-3469, 1-153 pp.

CODEN: FJBEE5; ISSN: 0366-0885

DT Report; General Review

LA German

CC 52-0 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 72

AB A review with 129 refs. deals with the thermodyn., electrode-kinetic, and structural aspects considered by the author in the design and construction of the electrolyzers and fuel cells. Three topics are treated: material stability for alkaline water electrolysis, reaction kinetics and mechanisms of the hydrogen and oxygen reactions as well as structural aspects of fuel cells. Firstly, the thermodyn. aspects of the structural materials of an alkaline water electrolyzer are presented. The second range of issues concerns the electrode kinetics of the electrochem. reactions of hydrogen and oxygen. In this connection, the problem of elucidating the reaction mechanism involved is a fundamental topic. An anal. of the reaction mechanism of the electrochem. reactions is discussed based on the numerical computer evaluation of a reaction mechanism presumed probable. The example of the design of the SOFC cermet anode is, furthermore, used to show that the electrochem. kinetics does not only represent the problem of mechanistic considerations but that spatial and structural effects also play an important part. The third topic concerns methods of calculating and designing the water electrolyzer and fuel cells. As an example, the two-dimensional calcul. of the methane-reforming reaction in the anode compartment of the ceramic high-temperature solid oxide fuel cell (SOFC) is shown. As a further example, the three-dimensional math. modeling of the low-temperature fuel cell with a polymer electrolyte membrane (PEM) is presented in an abbreviated form.

ST review electrochem energy conversion process engineering; fuel cell process engineering review; electrolyzer energy conversion process engineering review

IT Power

(generation; process engineering anal. of electrochem. energy conversion systems)

IT Reaction mechanism

(in process engineering anal. of electrochem. energy conversion systems)

IT Electrochemistry

Engineering

(process engineering anal. of electrochem. energy conversion systems)

IT Electrolytic cells

Energy converters

Fuel cells

Solid state fuel cells

(process engineering anal. of electrochem. energy conversion systems with examples of)

IT 7732-18-5, Water, processes

RL: PEP (Physical, engineering or chemical process); PROC (Process) (electrolysis; process engineering anal. of electrochem. energy

conversion systems with examples of)

L72 ANSWER 66 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN
 AN 1997:220550 HCAPLUS Full-text
 DN 126:214437
 ED Entered SIN: 05 Apr 1997
 TI Solid electrolyte fuel cells and their manufacture
 IN Matsukaze, Noryuki
 PA Fuji Electric Co Ltd, Japan
 SO Jpn. Kokai Tokkyo Koho, 9 pp.
 CODEN: JKXXAF
 DT Patent
 LA Japanese
 IC ICM H01M008-02
 ICS H01M008-12
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 09045347	A	19970214	JP 1995-191385	19950727 <--
PRAI	JP 1995-191385		19950727	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 09045347	ICM	H01M008-02
	ICS	H01M008-12
	IPCI	H01M0008-02 [ICM,6]; H01M0008-12 [ICS,6]
	IPCR	H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]

AB The fuel cells have a planar cell held between a pair of separators for supplying reaction gases to the cell, where the cell has a planar porous metal substrate, an anode on 1 side of the substrate, an electrolyte layer and a cathode on the other side, and a LaMnO₃ impregnated porous ceramic fiber felt between the cathode and the cathode side separator. The fuel cells are prepared by immersing a ZrO₂ fiber felt in a LaMnO₃ slurry and sintering in an oxidizing atmospheric to obtain the impregnated felt. This structure prevents damages to the fuel cells by thermal expansion.

ST solid electrolyte fuel cell ceramic felt;
 zirconia felt solid electrolyte fuel cell;
 fuel cell cathode lanthanum manganite felt

IT Felts

(ceramic; lanthanum manganese oxide impregnated zirconia fiber felts for cathode-separator interlayers in solid electrolyte fuel cells)

IT Ceramics

(felts; lanthanum manganese oxide impregnated zirconia fiber felts for cathode-separator interlayers in solid electrolyte fuel cells)

IT Solid state fuel cells

(structure and manufacture of solid electrolyte fuel cells containing lanthanum manganate impregnated ceramic felts)

IT 1314-23-4, Zirconia, uses

RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)

(lanthanum manganese oxide impregnated zirconia fiber felts for cathode-separator interlayers in solid electrolyte fuel cells)

IT 12031-12-8, Lanthanum manganate (LaMnO₃)

RL: MOA (Modifier or additive use); USES (Uses)

KATHLEEN FULLER EIC1700 571/272-2505

(lanthanum manganese oxide impregnated zirconia fiber felts for cathode-separator interlayers in solid electrolyte fuel cells)

L72 ANSWER 67 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1998:283605 HCAPLUS [Full-text](#)

DN 128:284437

ED Entered STN: 16 May 1998

TI Diffusion and methane reforming reactions in SOFC-anode substrates

AU Divisek, J.; Lehnert, W.; Meusinger, J.; Stimming, U.

CS Institute of Energy Process Engineering Research Center Julich, Julich, D-52425, Germany

SO Proceedings - Electrochemical Society (1997), 97-40(Solid Oxide Fuel Cells), 993-1002

CODEN: PESODO; ISSN: 0161-6374

PB Electrochemical Society

DT Journal

LA English

CC 52-1 (Electrochemical, Radiational, and Thermal Energy Technology)

AB Expts. were performed by. evaluation of the gas concentration changes after variation of the anode thickness at constant temperature With a steam/methane ratio of 3:1, the depth of the reaction zone is approx. 300 - 400 nm at 900°C for the standard composition of the SOFC anode cermet structure. Gas diffusion within SOFC anode substrates limits the overall reforming reaction. On basis of exptl. determined effective binary. diffusion coeffs. the values of the. volume reaction consts. of the steam reforming reaction, which takes place inside the SOFC cermet anode prior to the electrochem. anodic oxidation of the natural gas, were estimated The activation energy of the reforming was determined to 230 kJ/mol.

ST fuel cell methane steam reforming diffusion

IT Diffusion

Steam reforming

(diffusion and methane reforming reactions in SOFC-anode substrates)

IT Fuel cells

(solid oxide;; diffusion and methane reforming reactions in SOFC-anode substrates)

IT 1333-74-0, Hydrogen, processes

RL: PEP (Physical, engineering or chemical process); PROC (Process)

(diffusion and methane reforming reactions in SOFC-anode substrates)

IT 74-82-8, Methane, reactions

RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)

(diffusion and methane reforming reactions in SOFC-anode substrates)

RE.CNT 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Achenbach, E; J Power Sources 1994, V52, P283 HCAPLUS

(2) Buchkremer, H; Proc 2nd Europ Solid Oxide Fuel Cell Forum, Europ SOFC Forum 1996, P221

(3) Lee, A; Ind Eng Chem Res 1990, V29, P766 HCAPLUS

(4) Lehnert, W; Proc 2nd Europ Solid Oxide Fuel Cell Forum, Europ SOFC Forum 1996, P143

(5) Mogensen, M; Proceedings of the First Int Symp on Solid Oxide Fuel Cells 1989, V89-1, P99

(6) Rostrup-Nielsen, J; Catalytic Steam Reforming 1984, P57

(7) Valus, J; Appl Catal 1981, V1, P355 HCAPLUS

KATHLEEN FULLER EIC1700 571/272-2505

- (8) Weiland, T; Particle Accelerators 1984, V15, P245
(9) Yentekakis, I; Proc 3rd Int Symp on Solid Oxide Fuel Cells 1993, V93-4, P904 HCAPLUS

L72 ANSWER 68 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1997:651792 HCAPLUS [Full-text](#)

DN 127:312410

ED Entered STN: 15 Oct 1997

TI Geometrical analysis of SOFC (solid oxide fuel cell) anodes fabricated by electrochemical vapor deposition

AU Suzuki, Minoru; Kajimura, Atsuko

CS Fundam. Res. Lab., Osaka Gas Co., Ltd., Kyoto, 600, Japan

SO Denki Kagaku oyobi Kogyo Butsuri Kagaku (1997), 65(10), 859-864
CODEN: DKOKAZ; ISSN: 0366-9297

PB Denki Kagaku Kyokai

DT Journal

LA English

CC 72-2 (Electrochemistry)

Section cross-reference(s): 52, 56, 57

AB The electrochem. vapor deposition method (EVD) is superior for making a high performance and durable anode. The authors investigated the electrochem. roles of yttria-stabilized zirconia (YSZ) in this anode using a geometrical modeling of its microstructure. This cermet anode resembles a porous electrode in the liquid electrolyte system because the connection of the electrolyte at the electrolyte/anode interface is complete owing to the principle of EVD. Accordingly, the thin film model, which is one anal. model for the porous gas diffusion electrode in a liquid electrolyte, was applicable. The contribution of YSZ in the cermet anode, which transports oxide ion from the electrolyte interface of the anode reaction site, was evaluated quant. By comparing the calculated values with the exptl. results, it was found that the model known as the thin-film model can be used in the anal. of the anode made by EVD.

ST geometrical analysis solid oxide fuel cell; electrochem vapor deposition cermet anode fabrication; yttria stabilized zirconia solid electrolyte SOFC; ruthenium base yttria stabilized zirconia anode

IT Vapor deposition process (electrochem.; geometrical anal. of solid oxide fuel cell anodes fabricated by electrochem. vapor deposition)

IT Simulation and Modeling, physicochemical (in geometrical anal. of solid oxide fuel cell anodes fabricated by electrochem. vapor deposition)

IT Fuel cell anodes (solid-oxide; geometrical anal. of solid oxide fuel cell anodes fabricated by electrochem. vapor deposition)

IT 7440-18-8, Ruthenium, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(geometrical anal. of solid oxide fuel cell anodes based on yttria-stabilized zirconia fabricated on ruthenium by electrochem. vapor deposition)

IT 1314-23-4, Zirconia, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process); USES (Uses)
(geometrical anal. of yttria-stabilized zirconia fuel

cell anodes fabricated by electrochem. vapor
deposition)

IT 1314-36-9, Yttria, uses

RL: MOA (Modifier or additive use); PEP (Physical, engineering or chemical
process); PRP (Properties); PROC (Process); USES (Uses)
(geometrical anal. of yttria-stabilized zirconia fuel
cell anodes fabricated by electrochem. vapor
deposition)

RE.CNT 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

- (1) Ishii, T; Proc of 4th International Symposium on SOFC 1995, P295 HCAPLUS
- (2) Kenjo, T; Denki Kagaku 1985, V53, P957 HCAPLUS
- (3) Minh, N; J Am Ceram Soc 1993, V76, P563 HCAPLUS
- (4) Mizusaki, J; Solid State Ionics 1994, V70/71, P52
- (5) Mizutani, Y; Proc of 4th International Symposium on SOFC 1995, P301 HCAPLUS
- (6) Singal, S; Proc of 2nd International Symposium on SOFC 1991, P25
- (7) Suzuki, M; Solid State Ionics 1993, V62, P125 HCAPLUS
- (8) Uchida, H; Proc of 4th International Symposium on SOFC 1995, P712 HCAPLUS

L72 ANSWER 69 OF 89 HCAPLUS COPYRIGHT 2008 ACS ON STN

AN 1996:410775 HCAPLUS Full-text

DN 125:91305

ED Entered STN: 16 Jul 1996

TI Tubular solid electrolyte fuel cells with improved
perovskite oxide cathodes

IN Kimura, Tetsuya; Akyama, Masahide; Yamashita, Shoji; Nishihara, Masahito;
Tomisako, Masahiro

PA Kyocera Corp, Japan

SO Jpn. Kokai Tokkyo Koho, 5 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM H01M004-86

ICS C30B029-22; H01M008-12

CC 52-2 (Electrochemical, Radiational, and Thermal Energy
Technology)

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 08130017	A	19960521	JP 1994-266522	19941031 <--
JP 3346663	B2	20021118		
PRAI JP 1994-266522		19941031	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 08130017	ICM	H01M004-86
	ICS	C30B029-22; H01M008-12
	IPCI	H01M0004-86 [ICM,6]; C30B0029-22 [ICS,6]; H01M0008-12 [ICS,6]
	IPCR	C30B0029-10 [I,C*]; C30B0029-22 [I,A]; C04B0038-00 [I,C*]; C04B0038-00 [I,A]; H01M0004-86 [I,C*]; H01M0004-86 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]

AB The fuel cells have an O cathode on 1 side of a solid electrolyte and an anode on the other side; where the cathode is a porous sintered ceramics having a skeleton of LaMnO₃ based perovskite crystals and surface roughness Ra 0.05-8.8 μ m, with ≥ 70 volume% of the pores having diameter ≤ 4.0 μ m.

ST tubular solid electrolyte fuel cell cathode; lanthanum manganese oxide fuel cell cathode; LDPE fuel cell cathode porosity control

KATHLEEN FULLER EIC1700 571/272-2505

IT Cathodes
(fuel-cell, perovskite calcium lanthanum manganese
yttrium oxide cathodes for tubular solid electrolyte fuel
cells)

IT 167635-40-7P, Calcium lanthanum manganese yttrium oxide
(Ca_{0.4}La_{0.4}MnY_{0.2}O₃)
RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical
process); PRP (Properties); TEM (Technical or engineered material use);
PREP (Preparation); PROC (Process); USES (Uses)
(perovskite calcium lanthanum manganese yttrium oxide cathodes for
tubular solid electrolyte fuel cells)

IT 9002-88-4, Ldpe
RL: NUU (Other use, unclassified); USES (Uses)
(pore forming agent in manufacture of perovskite lanthanum manganese oxide
cathodes for tubular solid electrolyte fuel cells)

L72 ANSWER 70 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1996:271172 HCAPLUS Full-text

DN 124:348129

ED Entered STN: 09 May 1996

TI Anode current collectors for high temperature solid electrolyte
fuel cells

IN Morimoto, Kyoyuki; Shimozu, Masateru

PA Mitsui Shipbuilding and Engineering Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 4 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM H01M008-02

ICS C01G049-00; C04B035-48; H01M008-12

CC 52-2 (Electrochemical, Radiational, and Thermal Energy
Technology)

Section cross-reference(s): 56

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 08017453	A	19960119	JP 1994-152143	19940704 <--
	JP 3291670	B2	20020610		
PRAI	JP 1994-152143		19940704 <--		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 08017453	ICM	H01M008-02
	ICS	C01G049-00; C04B035-48; H01M008-12
	IPCI	H01M0008-02 [ICM,6]; C01G0049-00 [ICS,6]; C04B0035-48 [ICS,6]; H01M0008-12 [ICS,6]
	IPCR	C01G0049-00 [I,C*]; C01G0049-00 [I,A]; C04B0035-48 [I,C*]; C04B0035-48 [I,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]

AB The current collectors are composed of cermet containing 30-50 weight% (as Fe₂O₃) Fe and Y₂O₃-stabilized ZrO₂. The current collectors prevent peeling of electrolytes and have good electron conductivity and low catalytic activity in steam reforming of fuels.

ST fuel cell anode current collector
cermet; iron yttria zirconia cermet
anode collector

IT Anodes
(fuel-cell, compns. of cermet
anode current collectors for high temperature solid electrolyte

- fuel-cell)
IT 176708-29-5 176708-30-8 176708-31-9 176708-32-0
RL: DEV (Device component use); USES (Uses)
(anode current collectors for high temperature solid electrolyte
fuel-cell)
- L72 ANSWER 71 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN
AN 1996:678458 HCAPLUS [Full-text](#)
DN 126:49115
ED Entered STN: 16 Nov 1996
TI Porous ceramic membranes for direct internal reforming
molten carbonate fuel cells
AU Passalacqua, E.; Freni, S.; Barone, F.; Patti, A.
CS Institute CNR-TAE, via Salita S. Lucia sopra Contesse 39, S. Lucia,
Messina, Italy
SO Materials Letters (1996), 29(1-3), 177-183
CODEN: MLETDJ; ISSN: 0167-577X
PB Elsevier
DT Journal
LA English
CC 52-2 (Electrochemical, Radiational, and Thermal Energy
Technology)
AB The diffusion of alkali vapors in the anode compartment in a DIR-MCFC produces
the deactivation of the internal reforming catalyst. Several ceramic porous
membranes, to limit the KOH vapor diffusion and to protect the catalyst, have
been developed. The influence of the preparation technique and of the
preparative variables on the morphol. characteristics of the membrane
structures has been studied. A screening to select stable materials in the
operative conditions of MCFC has been conducted. Tests under simulated molten
carbonate fuel cell operative conditions have demonstrated the capability of
these membranes to control the alkali diffusion.
ST ceramic membrane molten carbonate fuel cell; internal
reforming molten carbonate fuel cell
IT Fuel cells
(molten carbonate; porous ceramic membranes for
direct internal reforming molten carbonate fuel cells
)
IT Ceramic membranes
Reforming
(porous ceramic membranes for direct internal
reforming molten carbonate fuel cells)
IT 409-21-2, Silicon carbide sic, uses 1309-48-4, Magnesia, uses
1314-23-4, Zirconia, uses 1344-28-1, Alumina, uses
12069-32-8, Boron carbide b4c
RL: DEV (Device component use); USES (Uses)
(membranes; porous ceramic membranes for direct
internal reforming molten carbonate fuel cells)
- L72 ANSWER 72 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN
AN 1995:973991 HCAPLUS [Full-text](#)
DN 124:12382
ED Entered STN: 09 Dec 1995
TI Solid electrolyte fuel cells with improved electron
conductive substrates
IN Shimizu, Kazushi
PA Fuji Electric Co Ltd, Japan
SO Jpn. Kokai Tokkyo Koho, 7 pp.
CODEN: JKXXAF
DT Patent
LA Japanese

IC ICM H01M008-02
 ICS H01M004-86; H01M008-12
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy
 Technology)
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 07245112	A	19950919	JP 1994-35121	19940307 <--
PRAI	JP 1994-35121		19940307	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 07245112	ICM	H01M008-02
	ICS	H01M004-86; H01M008-12
	IPCI	H01M008-02 [ICM,6]; H01M0004-86 [ICS,6]; H01M008-12 [ICS,6]
	IPCR	H01M0004-86 [I,C*]; H01M0004-86 [I,A]; H01M008-02 [I,C*]; H01M008-02 [I,A]; H01M008-12 [I,C*]; H01M008-12 [I,A]
AB	The fuel cells use electron conductive porous ceramic substrates for supporting unit cells stacked alternately with separators. The substrates may be ZrO2 containing conductive ceramics or a mixture of conductive ceramics and an electrode material. The substrates may be also serve as anodes or cathodes. The conductive ceramics is selected from ZrB2, TiB2, ZrN, TiN, ZrC, NbC, TiC, TaC, and SiC.	
ST	solid electrolyte fuel cell; electroconductive ceramic substrate fuel cell	
IT	Electric conductors, ceramic (porous conductive ceramic substrates for solid-electrolyte fuel cells)	
IT	Fuel cells (solid-state, porous conductive ceramic substrates for solid-electrolyte fuel cells)	
IT	1314-23-4, Zirconia, uses 12069-94-2, Niobium carbide 12070-08-5, Titanium carbide	
RL:	DEV (Device component use); USES (Uses) (porous conductive ceramic substrates for solid-electrolyte fuel cells)	

L72 ANSWER 73 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1995:710639 HCAPLUS Full-text

DN 123:88318

ED Entered STN: 29 Jul 1995

TI Current status of the fundamental studies on SOFC at Osaka Gas

AU Sasaki, Hirokazu; Suzuki, Minoru; Sogi, Tadayuki; Kajimura, Atsuko; Yagasaki, Eriko

CS Fundament. Res. Lab., Osaka Gas Co., Ltd., Kyoto, 600, Japan

SO Proceedings - Electrochemical Society (1995), 95-1(Solid Oxide Fuel Cells (SOFC-IV)), 187-94
 CODEN: PESODO; ISSN: 0161-6374

PB Electrochemical Society

DT Journal

LA English

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

AB The electrochem. properties of La(M)MnOx(M = Sr,Ca)/YSZ fabricated by CVD-EVD method were studied. It is indicated by the exptl. results using O2/N2 and O2/He as the cathode gas that the gas diffusion process at micro pores around the La(M)MnOx/YSZ interface mainly detrs. the rate of cathode reaction. The cathode had an extremely large phase boundary and the polarization was about

1mV at a c.d. of 1.5A/cm² in the oxygen at 1273K. It showed almost the same value of 1073K. The film growth properties of Ru/YSZ anode fabricated with the EVD process was examined. The structures of Ru/YSZ cermet were controlled by the thickness of YSZ electrolyte film and the reaction temperature

ST solid oxide fuel cell

IT Vapor deposition processes

(fundamental studies on solid oxide fuel cells at Osaka Gas)

IT Fuel cells

(solid-state, fundamental studies on solid oxide fuel cells at Osaka Gas)

IT 7440-18-8, Ruthenium, uses

RL: DEV (Device component use); USES (Uses)

(anode; fundamental studies on solid oxide fuel cells at Osaka Gas)

IT 59707-46-9, Lanthanum manganese strontium oxide 123273-09-6, Calcium Lanthanum manganese oxide

RL: DEV (Device component use); USES (Uses)

(cathode; fundamental studies on solid oxide fuel cells at Osaka Gas)

IT 1314-23-4, YSZ, uses 1314-36-9, YSZ, uses 64417-98-7, YSZ

RL: DEV (Device component use); USES (Uses)

(electrolyte and anode; fundamental studies on solid oxide fuel cells at Osaka Gas)

L72 ANSWER 74 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1994:704686 HCAPLUS Full-text

DN 121:304686

ED Entered STN: 24 Dec 1994

TI Solid electrolyte fuel cells with improved gas seals

IN Harufuji, Yasuyuki

PA Fuji Electric Co Ltd, Japan

SO Jpn. Kokai Tokkyo Koho, 7 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM H01M008-02

ICS H01M008-12

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 06231784	A	19940819	JP 1993-203506	19930818 <--
PRAI	JP 1993-203506	A	19930818	<--	
	JP 1992-232510	A	19920901	<--	
	JP 1992-327071		19921208	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 06231784	ICM	H01M008-02
	ICS	H01M008-12
	IPCI	H01M0008-02 [ICM,5]; H01M0008-12 [ICS,5]
	IPCR	H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]

AB The fuel cells have unit cells containing a cathode and an anode on opposite sides of a solid electrolyte layer having 2 penetrating holes for forming reaction gas supplying manifolds, a plate having 2 holes for forming reaction gas supplying manifold with 1 face for supplying a fuel gas to a cell anode

and the other face for supplying an oxidizing gas to a cathode, the electrolyte layer and the plate are stacked alternately with their holes aligned, and a sealing material composed of metal and ceramic aggregates and a glass binder placed between required areas at edge of the gas supplying plate and the unit cells. The aggregates may be ceramic fiber reinforced metal sheets or ~~cermet~~, the glass is selected from soda silicate glass, aluminosilicate glass, and Li silicate glass; the ceramic are selected carbon fibers, boron fibers, SiC fibers, polytitanocarbosilane fibers, ZrO₂ fibers, Al₂O₃ fibers, and powdered Al₂O₃, ZrO₂, SiO₂, MgO, and CaO; and the metal is selected from Al, Ag, Au, and Pt.

ST fuel cell gas seal; metal ceramic seal fuel cell; glass binder fuel cell seal

IT Seals (mechanical)

(gas seals containing metal and binder glass and ceramic powder for solid electrolyte fuel cells)

IT Carbon fibers, uses

RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)

(gas seals containing metal and binder glass and ceramic powder for solid electrolyte fuel cells)

IT Glass, oxide

RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)

(aluminosilicate, gas seals containing metal and binder glass and ceramic powder for solid electrolyte fuel cells)

IT Synthetic fibers

RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)

(boron, gas seals containing metal and binder glass and ceramic powder for solid electrolyte fuel cells)

IT Synthetic fibers

RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)

(ceramic, gas seals containing metal and binder glass and ceramic powder for solid electrolyte fuel cells)

IT Ceramic materials and wares

RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)

(fibers, gas seals containing metal and binder glass and ceramic powder for solid electrolyte fuel cells)

IT Glass, oxide

RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)

(sodium silicate, gas seals containing metal and binder glass and ceramic powder for solid electrolyte fuel cells)

IT Fuel cells

(solid-state, gas seals containing metal and binder glass and ceramic powder for solid electrolyte fuel cells)

IT 409-21-2, Silicon carbide, uses 1314-23-4, Zirconia,

uses 1344-28-1, Alumina, uses

RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)

(gas seals containing metal and binder glass and ceramic powder and fibers for solid electrolyte fuel cells)

IT 1305-78-8, Calcium, uses 1309-48-4, Magnesia, uses 7429-90-5, Aluminum,

uses 7440-06-4, Platinum, uses 7440-22-4, Silver, uses 7440-57-5,

Gold, uses 7631-86-9, Silica, uses

RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)

(gas seals containing metal and binder glass and ceramic powder for solid

electrolyte fuel cells)

L72 ANSWER 75 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN
 AN 1994:513316 HCAPLUS Full-text
 DN 121:113316
 ED Entered STN: 03 Sep 1994
 TI Fuel cell solid electrolyte films and their
 preparation
 IN Matsushima, Toshio; Nemoto, Isao
 PA Nippon Telegraph & Telephone, Japan
 SO Jpn. Kokai Tokkyo Koho, 6 pp.
 CODEN: JKXXAF
 DT Patent
 LA Japanese
 IC ICM H01M008-02
 ICS H01M008-12
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy
 Technology)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 06052869	A	19940225	JP 1992-223410	19920730 <--
PRAI	JP 1992-223410		19920730	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 06052869	ICM	H01M008-02
	ICS	H01M008-12
	IPCI	H01M0008-02 [ICM,5]; H01M0008-12 [ICS,5]
	IPCR	H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]

AB A fuel cell electrode substrate is successively coated with a densified electrolyte thin film (for closing the electrode substrate), and a sprayed electrolyte films formed by spraying to give the title films. The preparation involves coating a slurry containing solid electrolyte powders on an electrode substrate, sintering to give an electrolyte densified thin film, and forming a solid electrolyte sprayed film on the densified thin film by spraying. The preparation inhibits microcracking and deterioration of the electrolyte films.

ST Fuel cell solid electrolyte

IT Ceramic materials and wares
 (electrolyte, solid, for fuel cells, preparation of)

IT Spraying
 (in preparation of electrolytes for fuel cells)

IT Fuel cells
 (solid, multilayered, prepared by slurry application and spraying)

IT 55472-30-5
 RL: USES (Uses)
 (cermets, fuel anodes, solid electrolyte films for)

IT 114168-16-0, Yttrium zirconium oxide (Y0.16Zr0.92O2.08)
 RL: USES (Uses)
 (electrolytes, fuel cell)

IT 1314-21-4, Zirconia, uses
 RL: USES (Uses)
 (stabilized, electrolytes, fuel cell)

L72 ANSWER 76 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN
 AN 1994:683490 HCAPLUS Full-text
 DN 121:283490
 ED Entered STN: 10 Dec 1994
 TI Fabrication of high power density tubular type solid

KATHLEEN FULLER EIC1700 571/272-2505

oxide fuel cells
 AU Sasaki, H.; Ootoshi, S.; Suzuki, M.; Sogi, T.; Kajimura, A.; Sugiura, N.; Ippommatsu, M.
 CS Fundamental Research Laboratories, Osaka Gas Co., Ltd., 6-19-9, Torishima, Konohana-ku, Osaka, 554, Japan
 SO Solid State Ionics (1994), 72(Pt. 2), 253-6
 CODEN: SSIOD3; ISSN: 0167-2738
 DT Journal
 LA English
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 AB Tubular-type solid-oxide fuel cell with interconnector was successfully fabricated, with a maximum single cell power d. of 0.9 W/cm². A self-supporting La(Sr)MnOx tube was used for the cathode. The La(Sr)CrOx interconnector was made using the laser ablation method. The Y2O3-stabilized ZrO2 (YSZ) electrolyte and Ru/YSZ cermet anode were fabricated by electrochem. vapor deposition process.
 ST solid oxide fuel cell manuf;
 IT lanthanum strontium chromium oxide interconnector
 IT Fuel cells
 (solid-state, manufacture of high power d. tubular-type)
 IT 159035-64-0
 RL: DEV (Device component use); USES (Uses)
 (anodes; manufacture of high power d. tubular-type solid-oxide fuel cells with)
 IT 59707-46-9, Lanthanum manganese strontium oxide
 RL: DEV (Device component use); USES (Uses)
 (cathodes; manufacture of high power d. tubular-type solid-oxide fuel cells with)
 IT 57285-40-2, Chromium lanthanum strontium oxide
 RL: DEV (Device component use); USES (Uses)
 (interconnector; manufacture of high power d. tubular-type solid-oxide fuel cells with)
 L72 ANSWER 77 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN
 AN 1993:431509 HCAPLUS Full-text
 DN 119:31509
 OREF 119:5743a,5746a
 ED Entered STN: 24 Jul 1993
 TI Manufacture of cermet electrodes, especially solid-electrolyte fuel-cell anodes
 IN Suzuki, Minoru; Itsuhonmatsu, Masamichi; Sasaki, Hiroichi; Ootoshi, Masaji
 PA Osaka Gas Co Ltd, Japan
 SO Jpn. Kokai Tokyo Koho, 3 pp.
 CODEN: JKXXAF
 DT Patent
 LA Japanese
 IC ICM H01M004-88
 ICS B22F001-00
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 56, 57
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 05041218	A	19930219	JP 1991-196852	19910806 <--
	JP 3062632	B2	20000712		
PRAI	JP 1991-196852		19910806	<--	

CLASS
 PATENT NO. CLASS PATENT FAMILY CLASSIFICATION CODES

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JP 05041218      ICM      H01M004-88
                  ICS      B22F001-00
                  IPCI     H01M0004-88 [ICM,5]; B22F0001-00 [ICS,5]
                  IPCR     B22F0001-00 [I,C*]; B22F0001-00 [I,A]; B22F0003-10
                           [I,C*]; B22F0003-10 [I,A]; B22F0005-00 [I,C*];
                           B22F0005-00 [I,A]; C22C0032-00 [I,C*]; C22C0032-00
                           [I,A]; H01M0004-88 [I,C*]; H01M0004-88 [I,A]
AB  Grains of metals and/or alloys m. >1900° are sintered in a Cl-containing rare
    gas to obtain the title electrodes. The metals are selected from Ru, Os, Rh,
    Ir, and W; the Cl concentration in the gas is 0.001-10%; and the sintering
    temperature is 1000-1200°.
ST  solid electrolyte fuel cell anode; yttria
    zirconia ruthenium cermet anode; chlorine
    sintering cermet electrode
IT  Anodes
    (fuel-cell, cermet, manufacture of,
    chlorine-containing sintering atmospheric for)
IT  148373-84-6P  148373-85-7P  148373-86-8P
    RL: PREP (Preparation)
        (anodes, manufacture of, for solid-electrolyte fuel
        cells)
IT  7782-50-5, Chlorine, uses
    RL: USES (Uses)
        (sintering atmospheric containing, for cermet anode manufacture for
        solid-electrolyte fuel cells)

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L72 ANSWER 78 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1993:431499 HCAPLUS Full-text

DN 119:31499

OREF 119:5739a,5742a

ED Entered STN: 24 Jul 1993

TI Cermet electrode and its manufacture

IN Ipponmatsu, Masamichi; Suzuki, Minoru; Sasaki, Hirokazu; Otsoshi, Shoji

PA Osaka Gas Co. Ltd., Japan

SO Eur. Pat. Appl., 5 pp.

CODEN: EPXXDW

DT Patent

LA English

IC ICM H01M008-12

ICS H01M004-86

CC 52-2 (Electrochemical, Radiational, and Thermal Energy
Technology)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 526749	A1	19930210	EP 1992-111606	19920708 <--
	EP 526749	B1	19981028		
	R: DE, FR, GB				
	JP 05041217	A	19930219	JP 1991-196851	19910806 <--
	JP 3281925	B2	20020513		
	US 20020041990	A1	20020411	US 2001-5588	20011029 <--
	US 20040202920	A1	20041014	US 2004-836510	20040429 <--
PRAI	JP 1991-196851	A	19910806	<--	
	US 1992-909900	B1	19920707	<--	
	US 1995-378992	B1	19950126	<--	
	US 1996-611835	B1	19960306	<--	
	US 1997-864437	B1	19970528	<--	
	US 2001-5588	B1	20011029	<--	

CLASS

KATHLEEN FULLER EIC1700 571/272-2505

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 526749	ICM	H01M008-12
	ICS	H01M004-86
	IPCI	H01M0008-12 [ICM,5]; H01M0004-86 [ICS,5]
	IPCR	C23C0016-04 [I,C*]; C23C0016-04 [I,A]; H01M0004-86 [I,C*]; H01M0004-86 [I,A]; H01M0004-88 [I,C*]; H01M0004-88 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]
JP 05041217	ECLA	C23C016/04D; H01M004/86; H01M008/12B2B4
	IPCI	H01M0004-86 [ICM,5]; H01M0004-88 [ICS,5]
	IPCR	C23C0016-04 [I,C*]; C23C0016-04 [I,A]; H01M0004-86 [I,C*]; H01M0004-86 [I,A]; H01M0004-88 [I,C*]; H01M0004-88 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]
US 20020041990	IPCI	H01M0004-86 [ICM,7]; H01M0004-90 [ICS,7]
	IPCR	C23C0016-04 [I,A]; C23C0016-04 [I,C*]; H01M0004-86 [I,A]; H01M0004-86 [I,C*]; H01M0008-12 [I,A]; H01M0008-12 [I,C*]
	NCL	429/040.000; 429/044.000
US 20040202920	ECLA	C23C016/04D; H01M004/86; H01M008/12B2B4
	IPCI	H01M0004-90 [ICM,7]
	IPCR	C23C0016-04 [I,C*]; C23C0016-04 [I,A]; H01M0004-86 [I,C*]; H01M0004-86 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]
	NCL	429/044.000
	ECLA	C23C016/04D; H01M004/86; H01M008/12B2B4
AB	The electrode comprises grains of a metal m. $\geq 1900^\circ$ and/or an alloy containing this metal secured in position by Y2O3-stabilized ZrO2. The metal is selected from Ru, Os, Ir, Mo, and W. The electrode is manufactured by covering an Y2O3-stabilized ZrO2 support with grains of a metal m. $\geq 1900^\circ$ and/or an alloy containing this metal, and vapor depositing stabilized ZrO2 around the grains to secure them in position and to the support. The average diameter of the grains is $\leq 10 \mu\text{m}$. The electrode is used as anode in fuel cells. A Ru-stabilized ZrO2 anode was formed on a porous self-supporting cylindrical La0.81Sr0.09MnO3 air cathode coated with a 15- μm Y2O3-stabilized ZrO2 electrolyte layer.	
ST	fuel cell cermet anode; yttria zirconia ruthenium alloy anode	
IT	Vapor deposition processes (chemical, of yttria-stabilized zirconia, in manufacture of cermet anodes for fuel cells)	
IT	Anodes (fuel-cell, cermet, manufacture of)	
IT	145201-28-1P, Tungsten, yttrium zirconium oxide 148522-94-5P, Ruthenium yttrium zirconium oxide 148522-95-6P, Osmium yttrium zirconium oxide 148522-96-7P, Iridium yttrium zirconium oxide 148522-97-8P, Molybdenum yttrium zirconium oxide	
RL	PREP (Preparation) (anodes, manufacture of, for fuel cells)	
L72	ANSWER 79 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN	
AN	1993:476271 HCAPLUS <u>Full-text</u>	
DN	119:76271	
OREF	119:13667a,13670a	
ED	Entered STN: 21 Aug 1993	
TI	Model calculation of the planar SOFC by the finite volume element method	
AU	Blaise, C.; Divisek, J.; Steffen, B.; Koenig, U.; Schultze, J. W.	

- CS Res. Cent. Juelich, Juelich, D-5170, Germany
SO Proceedings - Electrochemical Society (1993), 93-4(Proceedings of the Third International Symposium on Solid Oxide Fuel Cells, 1993), 861-7
CODEN: PESODO; ISSN: 0161-6374
DT Journal
LA English
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
AB Using the fundamental laws of energy, mass, and charge conservation, the temperature, concentration and potential fields of the planar solid-oxide fuel cells (SOFC) are calculated by the finite integral technique. The calcn. takes into consideration the diffusion of gases in the porous electrodes, the nonlinearity of the electrochem. reaction, and the cermet structure of the anode. The computational method used offers the opportunity of obtaining a fine local resolution by using the multigrid technique.
ST solid oxide fuel cell planar
IT optimization
IT Optimization
(of planar solid-oxide fuel cells
, by model calcn.)
IT Fuel cells
(solid-state, planar, optimization of, by model calcn.)
L72 ANSWER 80 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN
AN 1993:606979 HCAPLUS Full-text
DN 119:206979
OREF 119:36847a,36850a
ED Entered STN: 13 Nov 1993
TI Ceramic materials for SOFC anode cermets
AU Marques, R. M. C.; Frade, J. R.; Marques, F. M. B.
CS Ceram. Glass Eng. Dep., Univ. Aveiro, Aveiro, 3800, Port.
SO Proceedings - Electrochemical Society (1993), 93-4(Proceedings of the Third International Symposium on Solid Oxide Fuel Cells, 1993), 513-22
CODEN: PESODO; ISSN: 0161-6374
DT Journal
LA English
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56, 57
AB Solid solns. based on Y2O3-stabilized ZrO2 (YSZ) doped with ≤ 10 mol% CeO2 or TiO2 were prepared and characterized as potential ceramic constituents of anode cermets for solid-oxide fuel cells (SOFC). The CeO2-doped materials exhibit negligible electronic conductivity when subjected to reducing conditions. The addition of .apprx.10 mol% TiO2 to YSZ increases the electronic conductivity of YSZ under the same reducing conditions. For the same concentration of mixed valence dopant, the addition of TiO2 is more effective in promoting electronic conductivity under reducing conditions, which contrasts with the smaller level of reduction achieved under such conditions, estimated from gravimetric measurements. Electronic defects with significantly different mobilities for the 2 dopants are formed during the reduction process. Based on the obtained results, the TiO2-doped YSZ materials are good candidates as anode cermet components for SOFC.
ST ceramic material anode cermet fuel cell; solid oxide fuel cell
anode cermet; yttria stabilized zirconia
ceramic anode cermet; ceria doped yttria
stabilized zirconia ceramic; titania doped yttria stabilized
zirconia ceramic

- IT Cermet
(anodes, yttria-stabilized zirconia ceramics for, ceria- or titania-doped, for fuel cells)
- IT Electric conductivity and conduction
(of ceria- and titania-doped yttria-stabilized zirconia ceramics, oxygen partial pressure dependence in relation to)
- IT Ceramic materials and wares
(zirconia, yttria-stabilized, ceria- or titania-doped, for anode cermets, for fuel cells)
- IT Anodes
(fuel-cell, cermet, yttria-stabilized zirconia ceramics for, ceria- or titania-doped)
- IT 150633-91-3, Titanium yttrium zirconium oxide (Ti0.05Y0.34Zr0.78O2.17)
150633-92-4, Titanium yttrium zirconium oxide (Ti0.1Y0.32Zr0.74O2.16)
150633-93-5, Cerium yttrium zirconium oxide (Ce0.01Y0.36Zr0.81O2.18)
150633-94-6, Cerium yttrium zirconium oxide (Ce0.05Y0.36Zr0.77O2.18)
150633-95-7, Cerium yttrium zirconium oxide (Ce0.1Y0.36Zr0.72O2.18)
RL: USES (Uses)
(ceramics, for anode cermets, for fuel cells)
- IT 108689-98-1, Yttrium zirconium oxide (Y0.36Zr0.82O2.18)
RL: USES (Uses)
(ceria- or titania-doped, ceramics, for anode cermets, for fuel cells)
- IT 1314-21-4, Zirconia, uses
RL: USES (Uses)
(yttria-stabilized, ceria- or titania-doped, ceramics, for anode cermets, for fuel cells)
- IT 1346-36-3, Ceria, uses 13463-67-7, Titania, uses
RL: USES (Uses)
(zirconia doped with, yttria-stabilized, ceramics, for anode cermets, for fuel cells)
- IT 1314-36-9, Yttria, uses
RL: USES (Uses)
(zirconia stabilized by, ceria- or titania-doped, ceramics, for anode cermets, for fuel cells)

L72 ANSWER 81 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1992:259068 HCAPLUS [Full-text](#)

DN 116:259068

OREF 116:43877a,43880a

ED Entered STN: 27 Jun 1992

TI Apparatus and method for manufacture of monolithic solid-electrolyte fuel cells

IN Minh, Nguyen Q.; Horne, Craig R.

PA Allied-Signal, Inc., USA

SO PCT Int. Appl., 34 pp.

CODEN: PIXXD2

DT Patent

LA English

IC ICM H01M008-24

ICS H01M008-12

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

FAN.CNT 1

PATENT NO.

KIND

DATE

APPLICATION NO.

DATE

PI WO 9204740 A1 19920319 WO 1991-US4854 19910710 <--
W: AU, BB, BG, BR, CA, FI, HU, JP, KP, KR, LK, MC, MG, MW, NO, PL,
RO, SD, SU
RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, DE, DK, ES, FR, GA, GB, GN,
GR, IT, LU, ML, MR, NL, SE, SN, TD, TG
US 5162167 A 19921110 US 1990-580886 19900911 <--
US 5290642 A 19940301 US 1990-580722 19900911 <--
AU 9185398 A 19920330 AU 1991-85398 19910610 <--
AU 647344 B2 19940317
IL 98709 A 19950831 IL 1991-98709 19910702 <--
IN 184407 A1 20000819 IN 1991-DE587 19910702 <--
CA 2090683 A1 19920312 CA 1991-2090683 19910710 <--
CA 2090683 C 20020910
EP 549695 A1 19930707 EP 1991-917236 19910710 <--
EP 549695 B1 19941214
R: DE, FR, GB, IT, SE
JP 06502957 T 19940331 JP 1991-515600 19910710 <--
PRAI US 1990-580722 A 19900911 <--
US 1990-580886 A 19900911 <--
WO 1991-US4854 A 19910610 <--

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 9204740	ICM	H01M0008-24
	ICS	H01M0008-12
	IPCI	H01M0008-24 [ICM,5]; H01M0008-12 [ICS,5]
	IPCR	H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]; H01M0008-24 [I,C*]; H01M0008-24 [I,A]
US 5162167	ECLA	H01M0008/24B2H4
	IPCI	H01M0008-10 [ICM,5]
	IPCR	H01M0008-24 [I,C*]; H01M0008-24 [I,A]
US 5290642	NCL	429/030.000; 029/623.300; 029/623.400; 429/032.000
	IPCI	H01M0008-10 [ICM,5]
	IPCR	H01M0008-24 [I,C*]; H01M0008-24 [I,A]
AU 9185398	NCL	429/033.000; 029/623.300; 029/623.400; 429/127.000
	IPCI	H01M0008-24 [ICM,5]; H01M0008-12 [ICS,5]
	IPCR	H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]; H01M0008-24 [I,C*]; H01M0008-24 [I,A]
IL 98709	IPCI	H01M0008-10 [ICM,6]
	IPCR	H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]; H01M0008-24 [I,C*]; H01M0008-24 [I,A]
IN 184407	IPCI	H01M0008-00 [ICM,7]
	IPCR	H01M0008-00 [I,C*]; H01M0008-00 [I,A]
CA 2090683	IPCR	H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]; H01M0008-24 [I,C*]; H01M0008-24 [I,A]
EP 549695	IPCI	H01M0008-24 [ICM,5]; H01M0008-12 [ICS,5]
	IPCR	H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]; H01M0008-24 [I,C*]; H01M0008-24 [I,A]
JP 06502957	IPCI	H01M0008-02 [ICM,5]; H01M0008-12 [ICS,5]
	IPCR	H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]; H01M0008-24 [I,C*]; H01M0008-24 [I,A]

AB Fuel cells are manufactured by preparing binder mixture-containing ceramic mixts. for anode, cathode, electrolyte, and interconnector; making thin electrode, electrolyte and interconnector tapes from resp. mixts.; laminating

anode and cathode tapes to opposite sides of electrolyte tapes; forming reaction-gas passages extending along the electrodes; cutting the laminates and the interconnector tapes, heating the laminates and the interconnector tapes to remove the binder mixture and at least to initiate sintering of the ceramic materials, alternately stacking the laminates and the interconnectors, and bonding the laminates and the interconnectors. Viscous slurries containing a binder (synthetic rubbers, polymers), a plasticizer (Bu Bz phthalate), a solvent, and the anode or cathode ceramic material may be used for bonding between interconnectors and resp. electrodes. Microcracks, ceramic migration, and slumping are avoided.

ST solid electrolyte fuel cell
 IT Ceramic materials and wares
 (anodes and cathodes and electrolytes, solid
 oxide-type fuel cells containing, binders for
 manufacture of, for cracking prevention)
 IT Cermet
 (anodes, solid oxide-type fuel
 cells containing, binders for manufacture of, for cracking prevention)
 IT Rubber, synthetic
 RL: USES (Uses)
 (binder, temporary, in solid oxide-type ceramic
 fuel cell manufacture, for cracking prevention)
 IT Plastics
 Polymers, uses
 RL: USES (Uses)
 (binders, temporary, in solid oxide-type ceramic
 fuel cell manufacture, for cracking prevention)
 IT Vinyl acetal polymers
 RL: USES (Uses)
 (butyral, binder, temporary, in solid oxide-type
 ceramic fuel cell manufacture, for cracking prevention)
 IT Fuel cells
 (solid-state, manufacture of, method and apparatus for cracking prevention
 in)

L72 ANSWER 82 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1992:534463 HCAPLUS Full-text

DN 117:134463

OREF 117:23291a,23294a

ED Entered STN: 04 Oct 1992

TI Lanthanum manganite air cathode with oxide-modified surface for
 high-temperature fuel cells

IN Singh, Prabhakar; Ruka, Roswell J.

PA Westinghouse Electric Corp., USA

SO U.S., 7 pp.

CODEN: USXXAM

DT Patent

LA English

IC ICM H01M008-10

INCL 429031000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy
 Technology)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	US 5106706	A	19920421	US 1990-599530	19901018 <--
	CA 2045769	A1	19920419	CA 1991-2045769	19910626 <--
	CA 2045769	C	20020820		
	AU 9179409	A	19920730	AU 1991-79409	19910628 <--
	AU 645324	B2	19940113		

KATHLEEN FULLER EIC1700 571/272-2505

NO 9103821	A	19920421	NO 1991-3821	19910930 <--
JP 04306561	A	19921029	JP 1991-296322	19911016 <--
JP 3291304	B2	20020610		
EP 485085	A2	19920513	EP 1991-309643	19911018 <--
EP 485085	A3	19930811		
EP 485085	B1	19960731		
R: BE, CH, DE, ES, FR, GB, IT, LI, NL, SE				
ES 2090256	T3	19961016	ES 1991-309643	19911018 <--
PRAI US 1990-599530	A	19901018	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 5106706	ICM	H01M008-10
	INCL	429031000
	IPCI	H01M0008-10 [ICM,5]
	IPCR	H01M0004-86 [I,C*]; H01M0004-86 [I,A]; G01N0027-407 [I,C*]; G01N0027-407 [I,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-10 [I,C*]; H01M0008-10 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]
CA 2045769	NCL	429/031.000; 429/033.000; 429/040.000
	IPCI	H01M0008-12 [ICM,5]; H01M0012-06 [ICS,5]; H01M0012-00 [ICS,5,C*]
	IPCR	H01M0004-86 [I,C*]; H01M0004-86 [I,A]; G01N0027-407 [I,C*]; G01N0027-407 [I,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-10 [I,C*]; H01M0008-10 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]
AU 9179409	ECLA	G01N027/407D; H01M008/12B2C2
	IPCI	H01M0008-12 [ICM,5]; H01M0004-36 [ICS,5]; H01M0004-48 [ICS,5]
	IPCR	H01M0004-86 [I,C*]; H01M0004-86 [I,A]; G01N0027-407 [I,C*]; G01N0027-407 [I,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-10 [I,C*]; H01M0008-10 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]
NO 9103821	IPCI	H01M0008-10 [ICM,5]
	IPCR	H01M0004-86 [I,C*]; H01M0004-86 [I,A]; G01N0027-407 [I,C*]; G01N0027-407 [I,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-10 [I,C*]; H01M0008-10 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]
	ECLA	G01N027/407D; H01M008/12B2C2
JP 04306561	IPCI	H01M0004-86 [ICM,5]; H01M0008-02 [ICS,5]; H01M0008-12 [ICS,5]
	IPCR	H01M0004-86 [I,C*]; H01M0004-86 [I,A]; G01N0027-407 [I,C*]; G01N0027-407 [I,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-10 [I,C*]; H01M0008-10 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]
	ECLA	G01N027/407D; H01M008/12B2C2
EP 485085	IPCI	H01M0008-12 [ICM,5]
	IPCR	H01M0004-86 [I,C*]; H01M0004-86 [I,A]; G01N0027-407 [I,C*]; G01N0027-407 [I,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-10 [I,C*]; H01M0008-10 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]
	ECLA	G01N027/56B5; H01M008/12B2C2; G01N027/407D
ES 2090256	IPCI	H01M0008-12 [ICM,6]
	IPCR	H01M0004-86 [I,C*]; H01M0004-86 [I,A]; G01N0027-407 [I,C*]; G01N0027-407 [I,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-10 [I,C*]; H01M0008-10 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]
	ECLA	G01N027/407D; H01M008/12B2C2

AB In fuel cells comprising a porous cermet anode, a porous La manganite cathode, and stabilized ZrO₂ solid oxide electrolyte, the La manganite cathode surface

facing the electrolyte contains a porous discontinuous layer of CeO₂ and/or Pr oxide and the electrolyte contacts both the La manganite and the discontinuous oxide layer. Preferably, the cathode thickness is 500-2000 μm and the discontinuous layer is in the form of discrete particles having diameter 0.01-0.1 μm and surface area 35-150 m²/g with 90-100% of the particles being in the top 50 μm of the cathode surface adjacent to the electrolyte. Fuel cells containing the La manganite air cathode with oxide-modified surface have high performance at higher c.d.

- ST Fuel cell lanthanum manganite cathode; lanthanum manganite cathode oxide modified; ceria modified lanthanum manganite cathode; praseodymium oxide modified cathode
- IT Fuel cells
(tubular, performance of)
- IT Cathodes
(fuel-cell, lanthanum manganite, with oxide-modified surface)
- IT 12036-32-7, Praseodymium oxide
RL: USES (Uses)
(cathodes with surface modified by, lanthanum manganite, for high-temperature fuel cells)
- IT 1306-38-3, Ceria, miscellaneous
RL: MSC (Miscellaneous)
(cathodes with surface modified by, lanthanum manganite, for high-temperature fuel cells)
- IT 109490-21-3, Calcium lanthanum manganese oxide (Ca_{0.2}La_{0.8}MnO₃)
RL: USES (Uses)
(cathodes, with cerium oxide-modified surface, for high-temperature fuel cells)
- IT 12031-12-8, Lanthanum manganese oxide (LaMnO₃)
RL: USES (Uses)
(cathodes, with oxide-modified surface, for high-temperature fuel cells)

L72 ANSWER 83 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1992:155382 HCAPLUS Full-text

DN 116:155382

OREF 116:26253a,26256a

ED Entered STN: 17 Apr 1992

TI The calculation of temperature and thermal stress distributions in the planar solid oxide fuel cell

AU Kanamura, Kiyoshi; Yoshioka, Shoji; Takehara, Zenichiro

CS Fac. Eng., Kyoto Univ., Kyoto, 606, Japan

SO Bulletin of the Chemical Society of Japan (1992), 65(2), 309-13

CODEN: BCSJJA8; ISSN: 0009-2673

DT Journal

LA English

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 57, 76

- AB The thermal stress distribution was simulated, for Y2O₃-stabilized ZrO₂ electrolyte tiles of solid oxide fuel cells. Calcns. indicate that the largest thermal stress occurs near the LaMnO₃ cathode region. If the linear expansion of the cathode material is 1.0×10^{-6} , the thermal stress on the tile will be relieved; the linear expansion of porous LaMnO₃ is 2.0×10^{-5} .

ST yttria ceria electrolyte thermal stress; fuel cell ceria electrolyte stress model

IT Thermal conductivity and conduction

- (of yttria-zirconia electrolyte tile, stress distribution in relation to)
- IT Fuel-cell electrolytes
(yttria-zirconia tiles, thermal stress on, modeling of)
- IT Cathodes
(fuel-cell, lanthanum manganese oxide, linear expansion of, electrolyte tile stress from, modeling of)
- IT Expansion, Dilation, and Elongation
(thermal, of yttria-zirconia electrolyte tile, stress distribution in, modeling of)
- IT 12931-12-8, Lanthanum manganese oxide (LaMnO₃)
RL: USES (Uses)
(cathodes, linear expansion of, yttria-zirconia electrolyte tile stress from, modeling of)
- IT 112721-99-0
RL: USES (Uses)
(cermet, anodes, porosity of, yttria-zirconia electrolyte stress distribution in relation to)
- IT 1314-23-4, Zirconium oxide (ZrO₂), uses
RL: USES (Uses)
(electrolytes of yttria-stabilized, thermal stress on, modeling of, in fuel cells)
- IT 1314-36-9, Yttrium oxide (Y₂O₃), uses
RL: USES (Uses)
(electrolytes of zirconia stabilized with, thermal stress on, modeling of, in fuel cells)
- L72 ANSWER 84 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN
- AN 1992:238726 HCAPLUS Full-text
- DN 116:238726
- OREF 116:40417a,40420a
- ED Entered STN: 13 Jun 1992
- TI High-power-density-solid-oxide-electrolyte fuel cells
- AU Sasaki, Hirokazu; Suzuki, Minoru; Otsoshi, Shoji; Kajimura, Atsuko; Ippommatsu, Masamichi
- CS Fundam. Res. Lab., Osaka Gas Co., Ltd., Osaka, 554, Japan
- SO Journal of the Electrochemical Society (1992), 139(1), L12-L13
- CODEN: JESQAN; ISSN: 0013-4651
- DT Journal
- LA English
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
- Section cross-reference(s): 57, 76
- AB A H-O solid oxide fuel cell, with maximum single cell power d. of 1550 mW/cm² was fabricated by sequential deposition of components in a tubular structure. A 10 µm-Y₂O₃-stabilized ZrO₂ (YSZ) electrolyte layer was deposited on a porous La_{0.81}Sr_{0.09}MnO_{3-δ} cathode tube by an electrochem. vapor deposition (EVD) method. A Ru-YSZ cermet anode was then deposited on top of the electrolyte, again by EVD.
- ST yttria zirconia electrolyte fuel cell;
fuel cell tubular high power; lanthanum strontium manganate cathode fuel cell; ruthenium zirconia cermet anode fuel cell
- IT Vapor deposition processes
(electrochem., of yttria-zirconia electrolytes, for tubular fuel cells)
- IT Fuel-cell electrolytes
(yttria-stabilized zirconia, electrochem. vapor deposited, in

- tubular structure)
- IT Cathodes
(fuel-cell, lanthanum strontium manganese oxide,
tubular porous, yttria zirconia electrolyte deposited on)
- IT Anodes
(fuel-cell, ruthenium-yttria-zirconia
cermet, on yttria-zirconia electrolyte and tubular
cathode structure)
- IT 7440-18-8, Ruthenium, uses
RL: USES (Uses)
(anodes of yttria-stabilized zirconia and, tubular
fuel cell with yttria zirconia electrolyte
and)
- IT 133895-67-7D, Lanthanum manganese strontium oxide (La0.81MnSr0.09O3),
oxygen deficient
RL: USES (Uses)
(cathodes of porous tubular, yttria-zirconia electrolyte on,
fuel cell with)
- IT 1314-23-4, Zirconium oxide (ZrO2), uses
RL: USES (Uses)
(electrolytes of yttria-stabilized, electrochem. vapor deposited,
fuel cells with)
- IT 1314-36-9, Yttrium oxide (Y2O3), uses
RL: USES (Uses)
(electrolytes of zirconia stabilized with, electrochem. vapor
deposited, fuel cells with)

L72 ANSWER 85 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1992:217994 HCAPLUS [Full-text](#)

DN 116:217994

OREF 116:36901a,36904a

ED Entered STN: 31 May 1992

TI Wet process for planar SOFC

AU Dokiya, M.; Sakai, N.; Kawada, T.; Yokokawa, H.; Anzai, I.

CS Natl. Chem. Lab. Ind., Tsukuba, 305, Japan

SO Comm. Eur. Communities, [Rep.] EUR (1993), EUR 13564, Proc. Int.

Symp. Solid Oxide Fuel Cells, 2nd, 1991, 127-34

CODEN: CECED9; ISSN: 0303-755X

DT Report

LA English

CC 52-2 (Electrochemical, Radiational, and Thermal Energy
Technology)

Section cross-reference(s): 57

AB The feasibility of wet fabrication processes for SOFC (solid oxide fuel
cells) was

evaluated for co-fire, the non-support film, and composite plate processes.
The co-fire process was quite difficult because of the mutual migration of Ca,
Mn, and Cr. To co-fire a cell as one piece, preventing migration, especially
of Ca in La, Ca chromite, is necessary. Very thin nonsupported films of YSZ
(Y2O3-stabilized ZrO2) were prepared by the doctor blade method; the films
were waved and had to be processed into flat layers. The flattening process
and the fragility of such films requires the use of partially stabilized ZrO2
for fabrication of large cells. Flat plates were obtained by the composite
plate process in which the doctor blade films and the foam sheets of YSZ were
co-fired. When the anode and/or the cathode were introduced in this composite
plate, the plates were bent and cracked frequently.

ST solid oxide fuel cell wet process

IT Electric conductors, ceramic

(lanthanum manganese oxides, wet fabrication process for, feasibility
of)

- IT Fuel cells
(solid-state, ceramics for, wet fabrication process for, feasibility of)
- IT 112721-99-0
RL: USES (Uses)
(cermets, anodes, fuel cell with, wet fabrication process for, feasibility of)
- IT 128932-09-2P, Lanthanum manganese strontium oxide (La_{0.84}MnSr_{0.07}O₃)
141094-37-3P
RL: PREP (Preparation)
(manufacture of, wet fabrication process for, feasibility of, for planar solid oxide fuel cell cathodes)
- IT 1314-23-4, Zirconia, uses
RL: USES (Uses)
(yttria-stabilized, electrolyte, fuel cell with, wet fabrication process for, feasibility of)
- IT 1314-36-9, Ytria, uses
RL: USES (Uses)
(zirconia stabilized with, electrolyte, fuel cell with, wet fabrication process for, feasibility of)
- L72 ANSWER 86 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN
- AN 1992:217993 HCAPLUS Full-text
- DN 116:217993
- OREF 116:36900h,36901a
- ED Entered STN: 31 May 1992
- TI Substrate type planar SOFC technology
- AU Shundo, H.; Shimizu, H.; Kusunose, N.; Iwata, T.; Maruyama, S.; Koseki, K.
- CS Fuji Electr. Corp. Res. and Dev. Ltd., Yokosuka, 240-01, Japan
- SO Comm. Eur. Communities, [Rep.] EUR (1991), EUR 13564, Proc. Int. Symp. Solid Oxide Fuel Cells, 2nd, 1991, 119-26
CODEN: CECED9; ISSN: 0303-755X
- DT Report
- LA English
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 76
- AB A planar type solid oxide fuel cell with a substrate structure was developed. The cell size is approx. 1000 cm², because a thin electrolyte plate is supported by a thick porous anode substrate. The contact resistance, which is one of critical issues for the planar type SOFC (solid oxide fuel cell), and performance of single cells with an effective electrode area of 50 and 200 cm² and a 4-cell stack with an effective electrode area of 50 cm² are described.
- ST fuel cell substrate type planar
- IT Fuel cells
(solid oxide, substrate type planar, performance of)
- IT Electric resistance
(contact, of metal and lanthanum strontium manganite)
- IT 126447-16-3, Lanthanum manganese strontium oxide (La_{0.1}MnSr_{0.1}O₃)
RL: USES (Uses)
(cathodes, contact resistance of metal and, in fuel cell)
- IT 112721-99-0
RL: USES (Uses)
(cermet, anode substrate, in solid oxide fuel cell)
- IT 12597-68-1, Stainless steel, properties 59928-14-2
RL: PRP (Properties)
(contact resistance of lanthanum strontium manganite and, in fuel cell)

L72 ANSWER 87 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN
 AN 1992:87653 HCAPLUS Full-text
 DN 116:87653
 OREF 116:14849a,14852a
 ED Entered STN: 06 Mar 1992
 TI Manufacture of sintered porous copper alloy plates for
 anodes in molten-carbonate fuel cells
 IN Hoshino, Koji; Kono, Toru
 PA Mitsubishi Metal Corp., Japan
 SO Jpn. Kokai Tokkyo Koho, 5 pp.
 CODEN: JKXXAF
 DT Patent
 LA Japanese
 IC ICM C22C001-08
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy
 Technology)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 03056631	A	19910312	JP 1989-192188	19890725 <--
PRAI	JP 1989-192188		19890725	<--	

CLASS

	PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
	JP 03056631	ICM	C22C001-08
		IPCI	C22C0001-08 [ICM,5]
		IPCR	C22C0001-08 [I,C*]; C22C0001-08 [I,A]
AB	Powdered Cu alloy containing 2-6 weight% Al, Zr, Ti, and/or Cr is mixed with 1-5 weight% Li aluminate powder, made into plates by a doctor-blade method, and the binder is removed from the plates. The plates are solidified, sintered at 400-900° in an oxidizing atmospheric, and then in a reducing atmospheric at 400-900° to obtain the title plates containing uniformly distributed fine oxide particles. These plates have suppressed warping, and fuel cells using these plates for anodes have high output voltage.		
ST	molten carbonate fuel cell anode; copper alloy fuel cell anode; alumina copper alloy anode; zirconia copper alloy anode; titania copper alloy anode; chromium oxide copper alloy anode		
IT	Anodes		
IT	(fuel-cell, copper alloy, oxide-containing, manufacture of)		
IT	1314-23-4, Zirconia, uses	1344-28-1, Alumina, uses	
IT	11118-57-3, Chromium oxide	13463-67-7, Titania, uses	
RL: USES (Uses)	(anodes containing, copper alloy, for molten-carbonate fuel cells)		
IT	12645-78-2	12665-55-3	39381-75-4, Copper 96, zirconium 4
RL: USES (Uses)	(anodes from sintered, manufacture of oxide-containing, for molten-carbonate fuel cells)		
IT	12003-67-7, Lithium aluminate (LiAlO2)		
RL: USES (Uses)	(in oxide-containing copper alloy anode manufacture, for molten-carbonate fuel cells)		

L72 ANSWER 88 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN
 AN 1991:27226 HCAPLUS Full-text
 DN 114:27226
 OREF 114:4771a,4774a

KATHLEEN FULLER EIC1700 571/272-2505

ED Entered STN: 26 Jan 1991
 TI Compact stacking of high-temperature fuel cells with
 zirconia-based electrolyte for high performance
 IN Bossel, Ulf
 PA ASEA Brown Boveri A.-G., Switz.
 SO Eur. Pat. Appl., 13 pp.
 CODEN: EPXXDW
 DT Patent
 LA German
 IC ICM H01M008-12
 ICS H01M008-24
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy
 Technology)
 Section cross-reference(s): 56, 57

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 378812	A1	19900725	EP 1989-123124	19891214 <--
R: CH, DE, FR, GB, IT, LI, NL, SE				
US 5034288	A	19910723	US 1990-461689	19900108 <--
JP 02227964	A	19900911	JP 1990-7268	19900118 <--
PRAI CH 1989-156	A	19890118	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 378812	ICM	H01M008-12
	ICS	H01M008-24
	IPCI	H01M0008-12 [ICM,5]; H01M0008-24 [ICS,5]
	IPCR	H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]; H01M0008-24 [I,C*]; H01M0008-24 [I,A]
US 5034288	IPCI	H01M0008-12 [ICM,5]
	IPCR	H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-12 [I,C*]; H01M0008-12 [I,A]; H01M0008-24 [I,C*]; H01M0008-24 [I,A]
	NCL	429/032.000; 429/038.000; 429/039.000
JP 02227964	IPCI	H01M0008-24 [ICM,5]; H01M0008-02 [ICS,5]; H01M0008-12 [ICS,5]

AB The in-series-connected flat cells are stacked by the filter principle by connecting each O cathode with adjacent fuel anode by an elec. conductive connector, which has channels for gaseous media. A group of 10-20 cells has a ceramic mech. support, and a metallic, ceramic, or cermet bipolar plate is used between modules of stacked cells.

ST fuel cell compact stack

IT fuel cells

(stacking of, compact)

IT 409-21-2, Silicon carbide, uses and miscellaneous 11068-71-6

12606-02-9, Inconel

RL: USES (Uses)

(in manufacture of bipolar plates for compact stacking of fuel cells)

L72 ANSWER 89 OF 89 HCAPLUS COPYRIGHT 2008 ACS on STN

AN 1989:598560 HCAPLUS Full-text

DN 111:198560

OREF 111:32961a,32964a

ED Entered STN: 25 Nov 1989

TI Solid-oxide fuel-cell matrix and modules

IN Riley, Brian

KATHLEEN FULLER EIC1700 571/272-2505

PA United States Dept. of Energy, USA; University of Chicago; Combustion Engineering, Inc.
 SO U. S. Pat. Appl., 33 pp. Avail. NTIS Order No. PAT-APPL-7-184 918.
 CODEN: XAXXAV
 DT Patent
 LA English
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 57

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 184918	A0	19890901	US 1988-184918	19880422 <--
	US 4943494	A	19900724		
PRAI	US 1988-184918		19880422	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 184918	IPCR	H01M0008-24 [I,C*]; H01M0008-24 [I,A]
	NCL	429/030.000; 429/034.000

AB Porous refractory ceramic blocks arranged in an abutting, stacked configuration and forming a 3-dimensional array provide a support structure and coupling means for a plurality of solid oxide fuel cells. Each of the blocks includes a square center channel which forms a vertical shaft when the blocks are stacked. Positioned in the channel is a unit cell such that a plurality of such units disposed in a vertical shaft forms a string in series-coupled SOFC units. A 1st pair of facing inner walls of each of the blocks each include an interconnecting channel hole cut horizontally and vertically into the block walls to form gas exit channels. A 2nd pair of facing lateral walls of each block further include a pair of inner half circular grooves which form sleeves to accommodate anode fuel and cathode air tubes. The stack of ceramic blocks is self-supporting, with a plurality of such stacked arrays forming a matrix enclosed in an insulating refractory brick structure having an outer steel layer. The necessary connections for air, fuel, burnt gas, and anode and cathode connections are provided through the brick and steel outer shell. The ceramic blocks are so designed with respect to the strings of modules that the strings can be replaced by hot reloading if 1 fails.

ST fuel cell ceramic matrix module

IT Fuel cells
 (solid-oxide, ceramic matrix and modules of
 stacked, with hot reloading concept)

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